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OF THE

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JULY, 1865.

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THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES

FOR JULY 1865.

ART. I.—*On Contusion and Contused Wounds of Bone, with an Account of Thirteen Cases.* By JOHN A. LIDELL, A. M., M. D., Surg. U. S. Vols., Inspector Med. and Hospital Department Army of the Potomac.

THE osseous framework of the human body is exposed to a considerable variety of lesions occasioned by violence; and, if we inquire at length into the causation of these injuries, it will be found that they are the necessary results or products of physical forces brought into activity by accidents, by design, or by war. The traumatic lesions of bone embrace a wide field, and present a subject of deep interest to every surgeon. An enumeration of the most important of them will assist us to estimate aright the extent and importance of the subject. Considered apart from the injury of the soft parts with which these osseous lesions may be accompanied, they embrace *firstly, simple fracture; secondly, comminuted fracture, i. e.*, fracture with splintering, shattering, or crushing of the broken bone, and *thirdly, wounds of bone.* The term fracture can, with propriety, be applied only to a forcible solution of the continuity which extends through the whole thickness of a bone; while the term wounds of bone embraces those other solutions of the osseous continuity, occasioned by violence, which do not extend through the whole thickness of it.

The wounds of bone are analogous to the wounds of the soft parts, and, like them, may be classified as follows: First, *incised wounds*, of which familiar examples are afforded by a cut into the tarsus inflicted with the sharp edge of an axe, or by a piece of the skull shaved off with a sharp sabre or cutlass. Second, *lacerated wounds*, an example of which is afforded by the coronoid process of the ulna when torn off by the action of the brachialis anticus muscle. This form of injury may be denominated a lacerated wound of the ulna, or a fracture of the coronoid process. Ano-

ther example of this lesion is afforded by a long splinter torn off from the side of a long bone by a rifle-ball. Third, *contused and lacerated wounds*, such as a groove or furrow ploughed on the surface of a bone by a musket-bullet. Fourth, *contused wounds*, properly so called, examples of which are produced by glancing balls, by spent balls, and by severe blows with any blunt instrument, whereby the external compact layer of a bone becomes cracked and perhaps indented also, while the investing periosteum and the underlying osseous tissue, at the same time, receive an injury in the nature of a bruise. Fifth, *perforating wounds*, such as, for example, a hole bored through the whole thickness of a bone by a gimlet or drill. Rifle-balls also sometimes pass through the condyles of the femur, the head of the tibia, and other portions of the osseous system, in such a way as to produce examples of this kind of injury. Sixth, *penetrating wounds*, instances of which are not unfrequently produced by small arms, as when a bullet passes through the body of a vertebra and lodges in the spinal canal, or penetrates the shaft of a long bone and lodges in the marrow, or penetrates its spongy epiphysis and lodges in the cancellous structure.

Besides the various forms of solution in the continuity of bone enumerated above, the osseous tissue is liable to be injured by violence in two other ways; viz., during the infantile period of life and before the calcification of the osseous tissue is far advanced, any of the long bones may be forcibly bent without fracture, numerous examples of which are on record; and, in the second place, *the osseous tissue is liable to be bruised*, there being, at the same time, no manifest disruption of the external compact layer, or any other part of the bone involved—a form of injury not unfrequently inflicted by spent musket-balls, by glancing musket-balls, and by the kicks of horses or mules. This kind of injury of the osseous tissue is properly known as *contusion of bone*.

For the purposes of clinical study and investigation, all the cases of traumatic lesion of the osseous tissue may be conveniently arranged in three principal groups. First, injury without solution of the continuity, *e. g.*, the contusion and the bending of bone. Second, partial solutions of the continuity, *e. g.*, the various wounds of bone; and third, complete solutions of the continuity, *e. g.*, fracture. By pursuing this course we are enabled to keep the extent and magnitude of the subject constantly before our minds, and, at the same time, devote ourselves to the study of any part of it without embarrassment.

The pathological history of contusion of bone will constitute essentially the theme of this paper. It is a subject which, heretofore, seems not to have attracted much attention. Nearly all of the systematic works on surgery, in common use in this country, such as those of Gross, Druitt, Smith, Ferguson, Miller, and Chelius by South, make no mention of it whatever. Mr. Erichsen alone gives a brief account of it. Even in the books devoted to a special discussion of the diseases and injuries of the

osseous system it is entirely overlooked. Mr. Stanley,[1] in his valuable work on the bones, and Mr. Paget, in his admirable lectures on surgical pathology, do not make any allusion to such a pathological condition of the osseous tissue as contusion. The writers on military surgery, for example, the late Mr. Guthrie, Dr. Macleod, Mr. Longmore, Dr. Williamson, Sir George Ballingall, and Dr. Hennen are equally silent on this subject in their respective works. Dr. Stromeyer, however, forms an exception, as he speaks of it while describing the action of bullets on the bone. He says:—

"They strike the bone without breaking it, and flatten themselves against its surface; the bone struck becomes necrotic from the destruction of its periosteum. In crowded hospitals such injuries of the larger long bones cause suppuration of the medullary canal, which, extending itself, at last by the passage of pus into the veins gives a fatal termination. In the autopsy (the bone being sawn in its long axis) the marrow is found filled with pus from the wounded part upward, and the same morbid product in the neighboring large veins, as in the femoral vein after contusion of the femur.

"The spot struck by the ball is colourless and exsanguine; in its circumference appears the commencement of a line of demarcation. Contusions of this kind, which, up to the present time, have been but little attended to in the long bones, are well known in the bones of the skull; when caused by a blow or fall, they have the same dangerous consequences, if not properly treated, as suppuration occurs in the diploe and purulent inflammation in the sinuses, with its usual results. Such contusions also occur in the cranial bones if a bullet strikes at a right angle, of which I have seen many examples, where it could be determined from the character of the wound in the soft parts that the same had been so struck without causing fracture or depression of the bone."—Vide *Statham's Stromeyer*, pp. 12 and 13, American edition.

But while Stromeyer thus distinctly recognizes the occurrence of contusion of bone, and, furthermore, that it is a lesion often fraught with great danger to life, he does not enter upon any extended discussion of the subject. He speaks of this form of contusion as he has seen it in the shafts of the long bones and in the bones of the cranium, but without the mention of any others. He does not attempt to point out the several varieties of osseous contusions, although they differ from each other very much, both in respect to phenomena and results. Nevertheless, he is entitled to no small amount of credit for having clearly pointed out the great danger to life which pertains to many cases of this kind of injury.

THE CONSEQUENCES OF CONTUSION OF BONE. *First. Ecchymosis of the Osseous Tissue.*—As already indicated above we find on investigation that the phenomena of the kind of injury under consideration do not, by any means, present a uniform character. They vary a good deal, according to the situation, structure, and vitality of the bone which happens to be bruised. For example, a contusion of the bones of the face (*cæteris*

[1] This statement is made from memory alone so far as Mr. Stanley's book is concerned, and here in the field, where this paper is being prepared, it is impossible to verify the statement by referring to the book itself.

paribus), is much more likely to do well than a contusion of the pelvic bones, and a contusion of the humerus than a contusion of the femur. This fact should, without doubt, be attributed to the superior supply of blood, and to the superior vitality which belongs to the osseous tissue in the upper part of the body when compared with that in the lower part of the organism. The structure of the injured bone itself has also an important bearing upon the pathological condition produced by the contusing force. For this reason the marks of a bruise are much more obvious from the very outset in a bone having a loose spongy structure, such as the condyloid epiphysis of the femur, than in one which is principally made up of compact tissue such as the diaphysis of the same bone. Furthermore, the pathological appearances produced by contusion in the spongy or cancellous osseous tissue bear a much stronger resemblance to a bruise of the soft parts, than the pathological appearances produced by contusion in the compact osseous tissue. This interesting fact tends to confirm the propriety of studying the lesions of bone by the light afforded from analogous lesions of the soft parts. Now, contusion of the soft tissues is always associated with an extravasation of blood into the meshes of the areolar tissue, called ecchymosis. This takes place from the capillary bloodvessels which happen to be ruptured by the contusing force. In like manner contusion of any bone having a spongy structure, such as the inferior epiphysis of the femur, *may* also be accompanied by an ecchymosed appearance of the bruised osseous tissue, occasioned by the extravasation of blood into the cancelli from the capillary vessels, which chance to be ruptured by the commotion among the osseous particles set up by the contusing force. The following case affords a good illustration of this point.

CASE I. *Gunshot wound of the left knee-joint with contusion of the internal condyle of the femur; ecchymosis of bruised osseous tissue; traumatic arthritis; secondary amputation of the thigh; recovery.*— Private Jacob Kimm, Co. E, 152d New York Vols., aged 21 years, and of good constitution, was admitted to Stanton General Hospital, June 4th, 1864, from the field, having received a severe gunshot wound of the left knee-joint, four days previously, May 31st, near Salem Church, Va. A rifle ball penetrated that joint from the front. There was no orifice of exit. He said the ball had not been extracted, and it was therefore supposed to be still lodged somewhere on the inside.

June 6. The knee is much swelled, painful, hot, and tender. The periarticular tissues are thickened by serous infiltration. The thigh, also, is moderately swelled; and the femoral tumefaction is increasing from day to day in spite of quietude, and a free application of ice to the inflamed parts. A thin and dirty looking pus mixed with synovia flows from the wound. On introducing my finger, the patient being etherized, the interior of the joint is readily explored in various directions, but without discovering the bullet or finding any comminution of the bone. His general condition is favourable. The constitutional disturbance (irritative fever) is but slight, having not yet been fully developed. There being no prospect of saving the limb the thigh was amputated this day by the double-flap

method about the junction of the middle with the inferior third; anæsthetic sulphuric ether. The loss of blood was small. But little shock attended the operation, and he reacted promptly after it. The subcutaneous areolar tissue was œdematous at the place of operation.

The after-treatment presented no difficulty. The stump united by granulation. The convalescence was rather slow, but satisfactory in every other respect.

Oct. 10. He has a good stump and expects to be discharged from the service in a short time.

The examination of the amputated member showed that the bullet had penetrated the joint, struck against the fore-part of the internal condyle of the femur and *bruised* it. But the projectile was not found in the joint or any of the neighbouring parts, and, therefore, it is supposed that it had either fallen out spontaneously, or had been withdrawn by the clothing. It was doubtless a spent ball. The synovial membrane was reddened (inflamed) throughout its whole extent. The synovial fringes exhibited the greatest amount of the reddening. The joint contained a quantity of thin, dirty-looking, flaky pus. The bone was not broken nor indented at the spot where the bullet impinged against it, but was only *bruised*. On sawing through the seat of the *contusion* the cancellous structure was found to exhibit pretty *extensive ecchymosis* in that locality. This *ecchymosed patch* was about an inch in diameter by something more than half an inch in depth. This *bruised* portion of the femoral condyle blackened by the extravasation of blood into its cancelli was surrounded by a sharply defined margin, which separated it from the healthy osseous tissue lying exterior to it.

In this man's case but six days elapsed between the infliction of the injury and the amputation of the injured member. This brief interval afforded too little time to allow any considerable development of the after-phenomena peculiar to ecchymosis of bone. But it is sufficiently obvious, that, whatever science may have lost from not delaying the amputation till a later period, the patient himself gained in the additional security to his life obtained thereby, since the knee-joint was involved in the traumatic lesion. It is, however, not difficult to conjecture some of the terminations which must follow after ecchymosis of bone, if we permit our reflections to be guided by the general analogy which obtains between ecchymosis of the osseous and ecchymosis of the soft tissues, and provided that we also make the necessary allowances for the differences in anatomical structure pertaining to the osseous and the soft tissues, and for the modifications in morbid action consequent thereon, being careful to pursue our reflections in a strictly philosophical spirit. For example, there is good reason to believe that the so-called interstitial absorption of the extravasated blood may take place spontaneously in some cases of ecchymosed bone, as well as it does in most cases of ecchymosed soft parts, and that in this way the lesion may terminate directly in recovery without the intervention of any morbid process whatever; or, in other words, it is possible that ecchymosis of bone may terminate spontaneously by resolution through the activity of certain of the normal physiological processes alone. Something analogous to this

we sometimes see, when a small ecchymotic extravasation of blood has occurred beneath one of the finger nails from a slight bruise. In such a case it happens that the overlying nail does *not die*, but the extravasated blood itself begins to disappear at the circumference of the bruise, and this process continues until the discoloration is wholly removed. And not the least interesting feature in such a case is, that we can readily see through the semi-transparent nail the progress towards recovery by resolution of an extravasation of blood beneath dense tissue, from one day to another.[1]

But there is also good reason to believe that ecchymosis of bone is not always attended with so fortunate a result. Now, in a case of *severe contusion* of any of the porous or spongy bones it is obvious that the quantity of blood extravasated into the cancelli of the bruised osseous tissue would be materially increased in such a way as to bear some relation to the severity of the contusion, and it is not difficult to conceive that the increased volume of the sanguineous effusion might be so great as to fill up the cancelli and the minute canals of the bruised part of the bone completely, and the tendency (*vis à tergo*) to extravasate continuing would extend the disastrous effects beyond this, and might even compress effectually the nutrient capillary bloodvessels against the hard unyielding osseous partitions, plates, and laminæ in relation with which, and in the midst of which they course along, and thus cut off completely the supply of blood to the ecchymosed osseous tissue. In this way the nutrition of the bruised portion of bone would be arrested, and a morbid condition, a necrosis, a dry gangrene of bone, analogous to senile gangrene of the soft parts, would be produced. In this way the blood extravasated into the cancelli, and the interspaces of bruised osseous tissue would destroy the vitality of that tissue as effectually as the products of inflammatory action sometimes do when they are suddenly effused into the interior structure of bone. In both alike necrosis is produced, and the inability on the part of the calcified osteine to stretch and yield, and thus permit swelling to take place so as to save the interior nutrient bloodvessels from compression, is mainly chargeable with its production.

The following case has an important bearing upon this part of the discussion. It affords a striking example of circumscribed necrosis, produced by the extravasation of blood into the porous structure of the inferior epiphysis of the femur. It shows, further, that the osseous tissue, whose vitality has been destroyed in this way, acts as a mechanical irritant upon the contiguous structure just like any foreign body; and that it may kindle in them an inflammatory action of great severity and of a fatal character.

[1] There is reason to believe that ecchymosis of bone from contusion occurs much more frequently than at first sight would be supposed; and that its termination by resolution accounts for the fact that it very often evades the surgeon's notice.

CASE II. *Contusion of the external condyle of the left femur inflicted by a glancing bullet, followed by severe inflammation of the knee-joint, although it had not been penetrated by the bullet; death from exhaustion after thirty-six days: ecchymosis of the bruised osseous tissue found at the autopsy.*—Private Thomas Pryor, Co. "H," 18th Mass. Vols., aged 19 years, was admitted to Stanton General Hospital, May 25, 1864, from the field, having been wounded at the battle of the Wilderness, May 5th, twenty days before, by a glancing minie-ball, which caused a superficial wound of the skin, and subcutaneous areolar tissue on the outer side of the left knee; but the joint was not opened by it.

He exhibited all the local symptoms of a *very severe inflammation of that joint*, besides which he suffered much constitutional disturbance in the shape of *a very low form of irritative fever*, and died of exhaustion, June 10th.

It was found at the autopsy that the *external condyle* of the left femur was *contused by the glancing bullet*, although the synovial sac was not penetrated by it. The *contused bone exhibited well-marked ecchymosis* through a circular space about one inch in diameter by three-fourths of an inch in depth, *and was surrounded by a distinct line of demarcation*, which was clearly shown by sawing through it. The contused portion of bone had a dark reddish-brown color. The interior structure of the epiphysis in general was redder than natural.

This case, reported at greater length, can be found in the last number of *The American Journal of the Medical Sciences*, Vol. XLIX. It is again introduced in this place, because it affords an apt illustration of the views just now expressed concerning ecchymosis of bone terminating in necrosis. Here we see an example wherein the extravasation of blood into the tissue of a spongy bone, occasioned by a bruise, was sufficient to arrest the supply of nutritive material to that portion of bone; and, in this way, deprive it of vitality, as has already been pointed out. Here we further see an example of the destructive results which may speedily follow necrotic ecchymosis of bone occasioned by severe contusion. The dead bone itself, like a foreign body, irritates the surrounding parts, and kindles in them an inflammatory condition as destructive to life as it is violent and prolonged.

The Second Important Consequence of Contusion of Bone which demands our attention is Ecchymosis of the Medullary Tissue.—This pathological condition is found only in the marrow of the long bones, and seems not to be accompanied by ecchymosis of the neighbouring osseous tissue; at least, this rule has obtained, in the several cases which have come under the writer's observation. While ecchymosis of the osseous tissue itself is confined to the spongy epiphyses, so far as the long bones are concerned, ecchymosis of the marrow is restricted to the limits of their diaphyses. It may, with propriety, be stated in a general way in this place, that the phenomena of contusion of the shaft of the long bones are somewhat different from those which pertain to contusion of bones having a spongy

or cancellous structure. The phenomena pertaining to the latter have already been considered at sufficient length. Now, when the shaft of any long bone, the compact tissue of which is very dense, and embraces the whole thickness unto the medullary canal, suffers contusion, no appearance of ecchymosis, appreciable to the unaided vision, will be discovered in the osseous tissue itself, on account of its want of sufficient porosity; but, at the same time, the commotion occasioned by the contusing force may be propagated inwards to the medullary canal, the capillary vessels therein may be ruptured by the force so propagated, and blood in abundant quantity may be extravasated into the marrow, causing it to present a bruised appearance. This is precisely what we have met with in several instances; and the following is a case in point.

CASE III. *Gunshot wound through calf of left leg; contusion of fibula with simple longitudinal fissure and extravasation of blood in the marrow; death thirty-five days afterwards from exhaustion.* Reported by Frederick Rorback, Medical Cadet, U. S. A.—Private James Sted, Co. "F," 20th Michigan Vols., aged 27, constitution apparently not vigorous, was admitted to Stanton General Hospital, July 4, 1864, suffering from a gunshot wound through the calf of the left leg, the missile being a minie-ball which had passed in close relation to the fibula. The wound had been received, June 28th, in front of Petersburg. At time of admission the orifice on the outer side of the leg presented a sloughy appearance. The one on the inner side also looked sloughy, but not so much so. Subsequently, the wound was treated with a solution of permanganate of potassa, under which it soon cleaned off, and the entire surface assumed a healthy granulating appearance.

At time of admission the patient's general condition was fair; but he was rather weak and debilitated. His appetite, however, was good. Quietude was enjoined, and nutrients and tonics were prescribed.

On the 5th, and again on the 12th of July, his bowels being torpid were moved by Sal. Rochelle. At this time stimulants began to be sparingly administered, as he appeared to be failing.

July 19. He was obviously much worse (asthenic), and complained of having a great deal of pain in the wounded parts. Milk-punch in very liberal quantity (so as to take ℥iss of spiritus frumenti every three hours), and pil. opii gr. j every four hours, were prescribed.

28th. His bowels became obstinately constipated. He continued to sink, and died, August 1st, of exhaustion. He did not have chills or febrile movement at any time; but slowly pined away, and died.

The autopsy disclosed the fact that the bullet had *bruised the fibula* on its outer surface at the upper third (junction with middle). Here the periosteum was reddened, thickened, loosened, and could be stripped off very readily for a distance of about three inches, but it was not yet completely separated. The osseous surface itself was considerably redder than natural, and roughened over the same space. The compact tissue was fissured longitudinally (a simple crack) at the place of contusion, and the crack extended into the marrow. There was also an old *extravasation of blood in the medullary tissue at the place of contusion.* It was dark-brown, or almost black in color, and occupied the whole thickness of the medullary canal through a space about one inch long; it appeared to date from the

contusion. Above this extravasated blood the *red inflammatory marrow of Virchow*[1] was seen.

The tibia was not injured; but the soft parts of the leg were a good deal swelled, and infiltrated with the products of inflammatory action.

The exact diagnosis in this case was not determined until, after death, an autopsy was made; but the existence of contusion of at least one of the bones of the leg was suspected during life, although an exploration of the wound with the finger always showed that the osseous tissue was not denuded of its periosteum, and that necrosis had not taken place. This suspicion grew out of the unsatisfactory progress of the case. The leg continued to be swelled and inflamed. The wound continued to discharge, and showed but little inclination to heal. The patient's strength slowly wasted away; and all this occurred without obvious cause. The wound of the soft parts was not complicated with fracture. The irritation in the surrounding tissues was not kept up by the presence of any foreign body. This had been demonstrated more than once by careful exploration with the finger. To what then could we attribute the adverse progress of the case? Having previously had some experience with contusion of bone, we were led to suspect that this patient was suffering from such a contusion, and from the morbid condition of the bone itself, and of the neighbouring soft parts, together with the system at large induced by it.

Here, then, was the gist of the matter. An inflammatory irritation[2] had been lighted up in the bone, the periosteum, and the marrow by the contusing force of the bullet, and by the presence of extravasated blood in the marrow. If such inflammatory irritation had not occurred, it is highly probable that the wound would have got well without any trouble, and if, at any time in the progress of the case, this irritation had ceased, the morbid condition of the soft parts would have soon disappeared. It is also highly probable that the bruised condition of the medullary tissue, and likewise the blood extravasated into its meshes, had a good deal to do with keeping up the inflammatory irritation, both local and general, and with continuing the exhausting drain upon the system occasioned by the suppuration.

Thus, the contusion of even a slender bone like the fibula, with moderate extravasation of blood into its medullary tissue, trivial as this injury may appear to be when isolated, and considered apart from its legitimate relations, became the cause of this man's death; and that, too, without having induced necrosis, or suppurative osteitis, or even periostosis.

This fact brings us to the consideration of another important consequence, in a pathological point of view, which may be produced by contusion of bone, viz., *Osteo-Myelitis of a Simple Character. This constitutes the third, in our order of enumeration, of the legitimate consequences of*

[1] *Vide* Lectures on Cellular Pathology, p. 458.

[2] *Vide* Virchow's Lectures on Cellular Pathology, p. 429.

this kind of injury. The last case affords a very good illustration of the pathological condition of bone to which the term *simple osteo-myelitis* may be applied. But it will be recollected that, in that case, the contusion of the bone was accompanied by an extravasation of blood into the medullary tissue. A case of contusion of bone, in which inflammatory irritation in the osseous tissue has been kindled directly by the contusion, and without the intervention of ecchymosis, is more strictly typical, and will, therefore, more exactly illustrate this part of the subject. The next case affords such an example.

CASE IV. *Gunshot wound of left thigh, followed by typhoid symptoms; death on the forty-second day from exhaustion; contusion of the shaft of femur with consecutive osteo-myelitis discovered at the autopsy.*—Private John Anderson, Co. G, 76th N. Y. Vols., aged 30, born in Sweden, was admitted to Stanton General Hospital, June 12, 1864, for a gunshot wound of the left thigh in the upper third, inflicted in action at Cold Harbor, June 6th, by a conical musket-bullet, which penetrated the front of the limb at the inner side of the femoral vessels, and, passing backwards and outwards through the limb, lodged beneath the skin. It was extracted by an incision from behind. When he came to the hospital, six days after the injury, it was thought that the wound was only a flesh one. His general condition was fair, or rather below par, at that time. Simple dressings to wound were ordered, and nutrients and stimulants were allowed. Subsequently the wound did well, and he appeared in a fair way to recover for a time.

July 1. It was observed that he was failing in strength and emaciating. Stimulants and the supporting treatment were continued with tinct. ferri muriat.

Afterwards he sank into a typhoid condition, the skin becoming warmer than natural, but without sweats, the pulse frequent and feeble, the tongue dry and red, with almost entire loss of appetite. He also became somnolent, and towards the last it was difficult to rouse him. He did not have any chills. He died July 18th. The amount of discharge from the wound was at no time great, but the thigh remained swelled and inflamed all the while.

On making an *autopsy*, it was found that the bullet had struck the shaft of the femur on its postero-inner side, two or three inches below the trochanter, *grazing and bruising it.* The aperture of exit had healed. There was an abscess about the place of injury of the bone, as large as an orange, and pus had also burrowed among the muscles of the thigh. There was a large deposit of new bone about the contused portion of the femur. A longitudinal section was made with a saw. New osseous tissue was also found deposited in the medullary canal. The marrow presented the "red inflammatory" appearance described by Virchow.[1] There was no thrombosis, nor any lesion whatever of the veins and arteries. The cadaver was considerably emaciated, and resembled in its general appearance that produced by typhoid fever. There was no lesion of the intestines or any other of the internal organs. For an account of the autopsy and for much other interesting information concerning this case, the writer is indebted to Asst. Surg. George A. Mursick, U. S. Vols.

[1] *Vide* Lectures on Cellular Pathology, p. 458.

The inflammatory irritation of the periosteum of the bone itself, and of the marrow, which was developed in this case, appears to have been a direct result of the contact between the bone and the bullet in motion (bruise). The morbid product of this inflammatory irritation[1] consisted mainly of deposits of new osseous tissue, both upon the exterior, and within the medullary canal of the femur, in the neighbourhood of the injury. The development of this new bone was accompanied by abnormal vascularity (redness) of the marrow, of the old bone, and of the periosteum. The consequence to the patient of this protracted inflammatory irritation of bone was, that the neighboring soft parts were kept in a swollen and inflamed condition, that an abscess formed, that pus burrowed among the muscles of the thigh, that irritative fever was established, and that, finally, death took place from exhaustion. In all its main features, this case coincides with the last.

It has already been stated in substance that the last two cases afford examples of a kind of inflammatory irritation resulting from contusion, which affects the periosteum, the bone itself, and the marrow, in such a way as to produce increased vascularity, denoted by redness (hyperæmia) of all those parts, accompanied by a bright red flesh-like appearance of the marrow, and by the formation of new bone in the medullary canal as well as in the parts outside of the external compact layer. Although, in both instances, this inflammatory irritation (simple osteo-myelitis) destroyed life, it produced such a result, not by the destruction of the bone itself, but by the mischief which it excited and afterwards kept up in the neighbouring soft parts, and in the system at large. In reality, these two cases furnish examples of osteo-myelitis with a tendency to hypertrophy, or the formation of an increased quantity of homologous tissue at the seat of irritation, the inflammatory action[2] being analogous in character to that which is called adhesive in the soft parts.

But contusion may, and often does, excite a more profound inflammatory action in the injured bone than that from the consideration of which we have now passed, and this osseous inflammation may be so intense as even to destroy the vitality of the shaft of a long bone to a very great extent, and in the course of but a few days.

This statement brings us to the consideration of *the fourth important consequence of contusion of the bone, viz., Necrotic Osteitis, or an inflammation of bone so severe in character as to terminate in necrosis.* Without doubt the periosteum and the medullary tissue also are involved in the inflammatory process, but the destructive action appears to be confined to the osseous tissue, and therefore the phrase, osteitis terminating in necrosis, seems to be more appropriate than that of osteo-myelitis having such a result. The following case presents a good illustration of extensive necrotic osteitis produced by contusion :—

[1] Op. cit., pp. 429, 430.

[2] *Formative irritation.* Virchow's Lectures upon Cellular Pathology, p. 438.

CASE V. *Contused wound of left tibia from a minie ball; severe constitutional disturbance, with chills, beginning on the twenty-first day; osteitis and extensive necrosis of shaft of tibia.* Reported by Acting Asst. Surg. John B. Garland, U. S. Army.—Corp. Henry Rall, Co. D, 15th N. Y. Heavy Art., aged 22, and sound in constitution, was admitted to Stanton General Hospital, June 4, 1864. This man had been wounded near Old Church, Va., May 30th, by a minie ball, in the upper third of the left leg. The bullet passed across the tibia about four inches below the patella, bruising the bone, and slightly grooving its surface. He was somewhat debilitated, but, upon the whole, his general condition was not unfavourable. Ordered quietude, cold water dressing to wound, porter, and a nourishing diet. This method of treatment was continued for fifteen days. The suppuration was profuse, the limb a good deal swelled, and the wound did not incline to heal. The progress of the case was not considered unsatisfactory during this time, taking into account the presence of an osseous lesion.

June 18. He had febrile symptoms last evening.

19*th*. He had a chill this afternoon, and the wound looks inflamed. Prescribed quiniæ sulph. gr. vi, three times a day.

20*th*. He had another chill, and complains of much debility, with loss of appetite. The wound is more inflamed. Prescribed quiniæ sulph. gr. x, three times a day, ferri et potass. tart. gr. v, every four hours, and whiskey f℥j, every three hours. Directed also the ice-dressing to be applied to the inflamed part, and morphia to be administered to secure freedom from pain.

25*th*. The chills have stopped, but the febrile movement continues, and the wound is sloughing. The whole leg is swelled and painful. Prescribed a solution of permanganate of potassa (one part to four) to be employed as a cleansing wash for the wound; tinct. ferri muriat. gtt. xx, ter in die, in place of the tartrate of iron and potassa, morphia at night; the quinia, stimulant, and ice-dressing are to be continued.

27*th*. The patient is free from fever, and has a fair appetite. The sloughing has stopped, but the leg is much inflamed, tender, and painful. Stimulants, tonics, and anodynes continued.

July 2. The leg is much swollen, and very painful, and exhibits deep-seated fluctuation. Opened it freely by an incision about five inches in length. A quantity of matter was discharged. The periosteum was found to be extensively separated from the tibia, and the bone itself appeared to be extensively necrosed. Ordered same plan of treatment to be continued, with pulv. opii gr. j every three hours.

10*th*. A second incision was made in the swollen leg, with a view to evacuate the pus more completely. Directed the quinine to be suspended, and the ice-dressing, stimulant, and opium, in the same doses, to be continued.

14*th*. The patient appears to be doing well. He has a good appetite, and appears to be more hopeful and cheerful.

23*d*. He is doing well.

30*th*. The wound does not run as freely as desirable. The granulations have assumed a less healthy look. They are flaccid and pale. Prescribed unguent. resinæ.

August 1. He had a chill last night, and is now (morning) bathed in cold perspiration. He has lost his appetite. Prescribed quiniæ sulph. gr. x, three times a day, tinct. ferri muriat. gtt. xx, three times a day,

alcoholic stimulants, and a flaxseed poultice to the leg, and he got better in a few days.

Sept 15. His general health is good. The leg now gives him but little trouble. There are several openings in the soft parts through which the tibia can be seen denuded of periosteum. The shaft of the tibia is extensively necrosed, and an involucrum developed from the periosteum is in process of formation.

Oct. 27. Examination with the probe shows that a large part of the shaft of the tibia is necrosed and loosened, but it is not yet sufficiently detached to justify removal by operation. The only treatment required during the past month has been poultices for leg, and a nourishing diet. His general condition is splendid. He has become quite fleshy. His appetite and spirits are excellent. At this time the writer relinquished the charge of the case, having been assigned to duty elsewhere, and therefore he is unable to continue the account of it.

He has, however, been informed by letter, under date of March 2, 1865, that the patient is still under treatment at Stanton Hospital.

In reflecting upon the clinical history of this case, it is interesting to notice that the osteitis which probably began on the 18th and 19th had terminated by destroying the vitality of a large part of the shaft of the bone involved (tibia) before the 27th. It is also interesting to notice the vigorous effort which nature made on the 25th to secure a free opening through the soft parts down to the inflamed bone, by causing the wound to slough. Again, an abscess formed in the soft parts about the bone which was laid open July 2 by an incision about five inches long, and the periosteum was then found to be extensively separated from the tibia. It became necessary to incise the leg extensively again on the 10th. From both of these incisions the patient derived much relief and much real benefit. Would he not have been benefited still more, if the leg had been laid open down to the inflamed bone, by long incisions, several days prior to July 2? Did not the sloughing, which attacked the wound June 25th, denote the necessity that existed for the construction of a freer opening? These questions bring up the subject of the treatment of contusion of bone, but as it can be more conveniently considered in another part of this paper, all remarks upon it will be deferred to that place.

There is one point in connection with the pathology of acute inflammatory necrosis which, perhaps, should be here brought more distinctly before our minds. It was briefly alluded to while discussing the *modus operandi* of necrosis produced by traumatic ecchymosis. In such cases, blood is extravasated into the interspaces of the osseous tissue, in such a way as to arrest the circulation in the portion of bone involved, by compressing the capillary vessels against the unyielding calcified osteine, which enters very largely into the composition of all osseous formations. In such cases, the death of the osseous tissue is occasioned directly by the arrested nutrition. Now, in cases of necrosis produced by inflammation of bone, the same result is brought about in a similar way. The main difference between the

modus operandi of these two forms of necrosis is, that in one of them *blood* is extravasated into the osseous tissue, and in the other the *products of inflammatory action*[1] are exudated into that tissue. In the one case, the compressing agent is extravasated blood, in the other case, it is an exudation produced by the inflammatory process and poured out into the interspaces, more especially the canaliculi of the inflamed bone. It is, therefore, no longer a subject of wonderment that severe osteitis is very apt to produce necrosis.

Again, *another, and in point of number the fifth, sad consequence of contusion of bone* which has come under the writer's observation *is Suppurative Osteo-Myelitis*, or inflammation of both the osseous and the medullary tissue accompanied by the formation of pus in those tissues. The following case affords a good example of it:—

CASE VI. *Contusion of the shaft of the left femur by a grazing bullet; extravasation of blood into the medulla; extensive necrosis the sequel of suppurative osteo-myelitis; pus in the medullary canal; death on the fiftieth day.* Reported by Acting Asst. Surgeon Charles H. Osborne, U. S. Army.—Sergt. F. Waltz, Co. D, 8th Mich. Vols., aged 39, was admitted to Stanton General Hospital, July 4, 1864. He had been wounded in battle before Petersburg, Va., June 30th, by a minie ball, which, entering the outer side of the right thigh in the upper third, passed transversely through posterior to the bone; then, entering the left thigh, passed through it grazing the femur, and lodged beneath the skin, from whence it was extracted by a small incision. At the time of admission to hospital, both wounds were suppurating freely, and his general condition was poor. Full diet, tonics, and stimulants were ordered, with ice-dressings to the wounds. His bowels being constipated, sal Rochelle ℥j was administered. He complained of pain in the shoulders and upper extremities. His bowels remained obstinately constipated, and required occasionally laxative medicine until August 10th, when the opposite condition set in, and he had from three to four passages during the twenty-four hours, attended with rigors. Bismuth and opium were added to the treatment. The tongue became coated, he lost his appetite, and by August 14th all the symptoms commonly pertaining to typhoid disease were fully developed. The treatment now consisted of nutrients, stimulants, small doses of ol. terebinth. in emulsion, and quiniæ sulph. in solution. The discharge from the wounds became more profuse and thin. *He complained of great pain in the left thigh. Necrosed bone was detected* by examination with the probe. Opium was administered to allay the pain, and the diarrhœa was partially checked by injections of starch and opium. He gradually sank deeper into the typhoid condition, and died August 19th.

Autopsy twenty hours after death.—Cadaver extremely emaciated; muscles of left thigh infiltrated with pus; femur extensively denuded of its periosteum; necrosis of its shaft for two-thirds its length; a new bony deposit surrounds the femur at place of contusion; the lower three-fourths of the *medullary canal* contain a *thin, greenish-coloured pus*, which empties itself where the bone is denuded; the upper fourth contains *old clotted blood.* Pus to the amount of f℥j was found within the capsule of the hip-joint.

[1] *Vide* Barwell on the Joints.

The lungs and heart were normal; liver slightly enlarged; spleen enlarged and soft; kidneys normal; Peyer's glands presented the "shaved chin" appearance.

The bullet had grazed and bruised the femur a short distance below the trochanters.

The porosity of the necrosed bone was very much increased.[1] It presented a worm-eaten or honeycomb appearance, which was most marked in situations where the periosteum had become detached. There was pus in the pores or interspaces in such localities.

This case presents an instance of inflammation of the osseous and the medullary tissue, occasioned by a spent bullet, still more unmanageable and destructive than any of the preceding ones, but, in view of what has been already said, it does not seem to require any extended comments.

There is *still another, the sixth, sad consequence of contusion of bone,* which has been witnessed by the writer. It is *Gangrenous Osteo-Myelitis,* or *a septic inflammation* of the osseous and of the medullary tissue, resulting not only in the death of those tissues, but in their *putrefaction and rapid disintegration.* The next case gives a good illustration of it.

CASE VII. *Gunshot wound of left thigh, upper third, from a spent bullet; contusion of femur at root of trochanter major, with fissure of external compact osseous layer, but without indentation; gangrene of bone; pyæmia; death on the twenty-first day.* Reported by Acting Asst. Surg. John B. Garland, U. S. Army.—Corp. Thomas C. Cranston, Co. I, Sixth Michigan Cavalry, aged 25, was admitted to Stanton General Hospital, June 4, 1864. He had been wounded near Salem Church, Va., May 26, in the upper third of the left thigh, by a conical musket-bullet, which penetrated the limb obliquely from the front, and, passing backwards, upwards, and somewhat inwards, lodged deeply. He stated that the bullet was extracted on the field through the orifice of entrance. Prescribed water dressings, quietude, and nutrients, until he should recover from the fatigue occasioned by transportation.

June 5. The wound presents a very unhealthy appearance, and discharges a thin, dirty-coloured, extremely offensive fluid. He is feverish and restless, with considerable jactitation; tongue coated with white fur; bowels have been constipated for several days; he has also some difficulty in passing urine. Prescribed a wash of permanganate of potassa (℥ij to Oj) for wound, bowels to be opened with ol. ricini, and directed him to take spt. nitre dulc. gtt. xxx in flaxseed-tea three times a day.

6th. He is no better; is still feverish, and looking badly; bowels have not acted. Ordered magnesia sulph. ℥j.

7th. The Epsom salt has operated, and he appears to be somewhat better; passes his water better; but he is still depressed, and his appetite is poor. Prescribed quiniæ sulph. gr. vj three times a day.

9th. He had a chill last night; has vomited bilious matter; has fever, cough with rusty-coloured sputa, and hurried respiration; complains of pain in the side; complains also of great weakness; it is evident that pneumonia has supervened; it is also probable that the bone has been

[1] Osteo-porosis (inflammatory). *Vide* Virchow's Lectures on Cellular Pathology p. 465.

bruised by the spent bullet. Directed a large sinapism to be applied to the breast, six dry cups to the back, the quinia to be continued, sherry wine ℥j every two hours, with nutrients, and tepid sponging of the body under blankets.

11*th.* He is much worse; has pyæmic chills and sweats. Continue treatment, with the addition of whiskey ℥viij per day.

12*th and* 13*th.* The chills and sweats continued.

14*th.* He is lethargic, and evidently sinking.

15*th.* He died.

Autopsy twelve hours after death.—The bullet had penetrated the left thigh in the upper third, at the external border of the sartorius muscle, and passed backwards and upwards in such a manner as to hit the femur at the root of trochanter major, *bruising that bone,* and *cracking its external compact layer, but without indentation.* There were some small scales and particles of lead still adhering to the bone. *The whole of the superior femoral epiphysis was denuded of periosteum, and gangrenous, down to the commencement of the marrow. On section with a saw, the gangrenous osseous tissue presented a dirty dark-green or greenish-brown colour, and an offensive odour of putrefaction. There was an abscess in the marrow at the upper end of medullary canal.* The hip-joint was filled with unhealthy pus; no opening in capsular ligament.

The lungs were studded throughout with a large number of small whitish pustules, the so-called secondary abscesses, and the lower lobe of the right lung was hepatized (red). About three gills of lemon-coloured fluid were found in the pericardium. The heart was normal. Each kidney exhibited three or four small superficial abscesses looking not unlike pustules. The spleen was large, and exhibited also a few small superficial abscesses, with some induration of the tissue surrounding each of them. The liver and the other organs were normal.

The anatomico-pathological differences between the form of gangrene of bone presented by this case and ordinary necrosis are well marked. For example, a piece of necrosed bone is apt to be dry, white in colour, comparatively inodorous so far as the tissues entering its own composition are concerned, and it bears a strong resemblance to the ordinary bleached osseous tissue of the skeleton in appearance. But gangrenous bone, or rather the kind of it described above, is moist, dirty gray, dirty pale-green, or dirty greenish-brown in colour, and exhales to a greater or less extent the intolerably offensive odour of rotting bone. The writer has seen many other instances of this form of gangrene of bone connected with severe traumatic lesions of the osseous tissue, one of which, the case of Mackey, was reported in the last number of this journal (vide *American Journal of the Medical Sciences,* vol. xlix. p. 300, April, 1865). Some of them have occurred in connection with compound comminuted fracture of the femur, and others in the stump bones of amputated limbs. In the case of Mackey the compact tissue presented a white appearance, but the general features in all of them have been essentially the same, and of so marked a character as to make it not difficult to discriminate between the gangrenous bone and the morbid specimens of osseous tissue obtained from cases of ordinary necrosis.

It is worthy of remark that, in the case reported above, the gangrene of bone was accompanied by pyarthrosis of the hip-joint, and by pyæmia, with the so-called secondary abscesses peculiar to that disease. The same relation has obtained between gangrene of bone and pyæmia in other cases that have come under the writer's notice; but it has not done so in all of them, for in the case of Mackey the autopsy showed that there was neither thrombosis nor secondary abscesses in any part of the body, and the symptoms developed during life did not in any way favour the supposition that pyæmia had supervened.[1]

ON NECROSIS PRODUCED DIRECTLY BY THE CONTUSION OF BONE, WITHOUT THE INTERVENTION OF EITHER ECCHYMOSIS OR INFLAMMATORY IRRITATION.—Up to this point in the discussion our attention has been mainly occupied with the consideration of traumatic ecchymosis of the osseous tissue, and with the study of certain inflammatory conditions of bone produced not unfrequently by contusions, such as inflammatory necrosis, simple osteo-myelitis, suppurative osteo-myelitis, and gangrenous osteo-myelitis. In all these various pathological conditions of the osseous tissue, induced by injury in the nature of a bruise, the death of the osseous tissue involved (necrosis) has not been occasioned directly by the contusing force itself, but indirectly by the intervention of some pathological process, such as the extravasation of blood, or the exudation of some of the products of inflammatory action, into the osseous tissue, etc. etc. We now proceed to the consideration of a form of necrosis which is occasioned directly by the mechanical commotion set up among the osseous particles themselves, by the sudden application of sufficient force in the nature of a bruise, without the intervention of any pathological process whatever. In all such cases the injured part of the bone loses its vitality at once, and becomes colourless and exsanguine. This is the form of contusion of bone inflicted by a spent ball which attracted Dr. Stromeyer's attention. He says: "The spot struck by the ball is colourless and exsanguine; in its circumference appears the commencement of a line of demarcation." In all such cases a circumscribed portion of the osseous tissue is killed outright, and nature immediately commences preparations for its separation and removal from the living bone surrounding it. This form of osseous contusion may be produced by the kicks of animals, by blows, and by falls, as well as by spent bullets. The following case is an example of this kind of injury produced by a glancing bullet:—

CASE VIII. *Gunshot wound of scalp and contusion of cranium inflicted by a glancing bullet; necrosis and exfoliation of the bruised*

[1] This is not intended as a complete discussion of the subject of osteo-myelitis. The writer here speaks of that disease mainly as he has seen it in connection with one class of gunshot injuries, viz., contusion and contused wounds of bone.

osseous tissue; recovery. Reported by Acting Asst. Surg. W. B. Dick, U. S. Army.—Private Henry Abbott, Co. B, 32d Mass. Vols., was admitted to Stanton General Hospital, June 4, 1864, for a wound of the head inflicted a few days before by a glancing bullet. It struck him over the right parietal bone, thence passed forwards and downwards, exposing the temporal suture, and escaped, having made a wound of the scalp about three inches in length, and exposing the cranium. *The bone was not fractured.* The patient's general condition was excellent. He did not exhibit any cerebral symptoms worth mentioning. His bowels were soluble. Treatment: quietude, ice-dressing to head, tinct. rad. aconiti gtt. ij every three hours, and a spare diet.

June 7. He has diarrhœa, with six or eight evacuations in twenty-four hours. Prescribed opium gr. ½; acid. tannic. gr. j; pulv. camphor. gr. ij; to be administered after each passage. The diarrhœa ceased in a short time, and his general health continued good.

July 12. Removed a piece of necrosed bone about an inch in length by half an inch in breadth. It included a portion of the temporal suture, and was composed of the outer table and the diploe. The wound is filled with healthy granulations. The patient has good health. Prescribed the water-dressing in place of ice.

14*th.* Removed another piece of necrosed bone about half an inch in length, and corresponding to that already mentioned. It consisted of the internal table.

17*th.* Health very good; wound almost healed.

18*th.* Left the hospital, having been transferred to the North.

In this case a projectile fired from small-arms struck the cranium in such a way as to destroy the vitality of both tables over a considerable space, without producing fracture, or any solution of continuity whatever perceptible to the unaided vision. In the course of about six weeks the dead bone became detached, and was then extracted. In a few days longer the wound healed up. All of this took place without the occurrence of inflammation of the bone or of the adjacent soft parts, or even the exhibition of any cerebral symptoms worth mentioning. This circumscribed necrosis, involving both tables of the skull, could not have been produced by osseous inflammation, because that morbid process was not present at any time during the progress of the case; it could not have been produced by extravasation of blood into the pores and interspaces of the bruised bone, because the tissue of the necrosed fragments was clean, white, and not stained with blood, as it would have been under such circumstances; the conclusion is therefore irresistible that in this case a portion of living bone was killed outright by the stroke of the glancing projectile. By it a violent commotion was produced among the osseous particles, which must have proved highly detrimental to the integrity of the bone cells. Now, when we reflect upon the important office in the economy of the osseous tissue performed by the branched cells discovered by Virchow; that all the natural processes of the growth and decay, of the waste and repair of that tissue, are effected through the agency of these bone cells; that the office discharged by the bloodvessels of bone is, in reality, secondary to that fulfilled

by the cells, for the vessels must be considered as the pipes through which nutritive and other material is brought into the interior of the osseous tissue, where it undergoes a variety of transformations through the instrumentality of the bone cells; bearing this in mind, it is easy to conceive that any agency which would greatly disturb the integrity and the relations of the bone cells would also destroy the vitality of the bone itself. Barwell says: "Bone consists of a number of branched cells, whose interstices (intercellular spaces) are occupied by a compound of cartilage and phosphate of lime, and among which vessels pass in a certain definite relation. By adopting this method of description, the different elements of which bone is composed are reduced to their proper relation—first the cells, then the cellular substance, and then the vascular supply." (*Barwell on the Joints*, p. 19, American edition.) The bone cells are, without doubt, the most important histological element which enters into the composition of bone. In the variety of osseous contusion now under consideration, may it not be true that the necrosis is due to the rupture of some of the bone cells, and the disturbance of the relations between others of them, occasioned by the commotion among the particles of the osseous tissue produced by the contusing force? The writer begs leave to commend this subject to the attention of all investigators in the domain of osseous pathology.

The separation of the dead from the living bone in this class of cases is accompanied with the following phenomena: From the living osseous tissue, where it borders on to the dead, the calcareous matter is gradually withdrawn by absorption under the local excitement produced by the dead bone acting as an irritant, and, at the same time, the bone cells and the connective tissue throughout the same locality assume the appearance of fleshy red granulations.[1] In this way the dead becomes separated from the living osseous tissue by a layer of florid soft granulations *formed at the expense of the living tissue*, which accounts for the fact that in the dried specimens of circumscribed necrosis the cavity is frequently found to be larger than the piece of dead bone which came out of it. This disparity in size is not due to a solution of the exterior of the necrosed fragment in the puriform fluid with which it is bathed, but to the beautiful process of conservation noticed above.

The case last narrated marched on to recovery without the occurrence of any untoward symptoms. The necrosed bone exfoliated, and was removed without any difficulty whatever. But we do not always have the same good fortune in the management of similar cases. That they do not always present the same freedom from suffering and danger will be perceived on the perusal of some of the following cases. While the process of exfolia-

[1] *Vide* Virchow's Lectures on Cellular Pathology, pp. 462–465. He says: "Granulations are nothing more than a young, soft, mucous tissue, analogous to marrow."

tion is taking place, an inflamed condition of the contiguous soft parts, attended with the formation of pus, is exceedingly apt to be present, and to inflict much suffering upon the patient. In occasional instances an inflammatory action is kindled in the surrounding osseous tissue, so severe in character as to terminate in inflammatory necrosis of a large part of the bone which had not suffered from the original injury; and in still rarer instances a suppurative inflammation is lighted up in the cancellous structure, or in the marrow, which may terminate in death by pyæmia before the process of exfoliation has been completed.

The following case will serve to illustrate the troublesome character of the sympathetic inflammation of the soft parts which is not unfrequently excited during the exfoliation of osseous tissue that has been deprived of its vitality by the stroke of a musket-ball:—

CASE IX. *Contusion of external malleolus of left ankle from fire-arms; exfoliation of the bruised osseous tissue; recovery.* Reported by John Moore, Med. Cadet U. S. Army.—Priv. Pat. McCabe, Co. "G," 87th Penn. Vols., aged 23, was admitted to Stanton General Hospital, July 4, 1864, having been struck by a musket-ball in front of Petersburg, Va., June 23d, which inflicted a flesh wound of the left ankle, about two inches in length, and in relation with the external malleolus. The bone proved to be contused, but its surface was not grooved, indented, fissured, or discoloured.

At the time of admission to hospital the limb was greatly swelled up to the knee, and the pain, throbbing in character, was very intense. The patient exhibited a good deal of constitutional disturbance, adynamic in character. The ice-dressing was applied to the inflamed parts, and stimulants and tonics (porter and iron) were given internally.

July 5. A flaxseed poultice was applied to the ankle, but it afforded no relief whatever. The swelling and pain continued unabated.

10*th*. An abscess having formed on the dorsum of the foot, it was evacuated by making a free incision, but the patient still continued to suffer a great deal of pain, and the swelling did not subside.

August 1. A thin narrow piece of bone about an inch in length exfoliated from the external malleolus, and was taken out of the wound. Subsequently another small piece of necrosed bone was removed. After the last piece of bone came away the patient began to improve rapidly. By the forepart of September the swelling had almost entirely disappeared, leaving only a moderate amount of thickening of the ankle. The pain had entirely disappeared.

Sept. 12. The patient is improving rapidly under potass. iodid. The thickening of the ankle has almost gone, and the wound is nearly healed. There is but little motion at the ankle-joint. He is in good condition and in fine spirits, although still confined to bed.

20*th*. He continues to improve rapidly, and leaves the bed daily to sit up in a chair.

25*th*. He begins to walk with crutches.

Oct. 3. He left the hospital on furlough for sixty days.

It is an interesting fact that in this case, as in the last, it required about six weeks to complete the process of exfoliation, and that, although the

injury was sustained in close proximity to one of the largest of the articulations, he made a good recovery with what it was thought would prove to be a useful limb in the end. The process of separating the dead from the living osseous tissue (exfoliation) in this case was accompanied by much inflammatory excitement in the adjacent parts, and by the formation of an abscess on the dorsum of the foot which required to be treated by free incisions. This inflamed condition of the ankle was attended with a good deal of pain, because both the joint cavity and the dense periarticular tissues were involved in the swelling. This inflammatory mischief was kept up by the irritation occasioned by the presence of dead bone in the midst of sensitive living tissues. It was highly interesting to notice the rapidity with which the patient improved so soon as all the necrosed bone had come away. The pain ceased at once, the constitutional disturbance disappeared, and the swelling subsided in a short time.

Another interesting fact pertaining to this case is that the joint inflammation, although it lasted for so long a time, was not destructive in its character. It was not accompanied by the formation of pus in the interior of the articulation, and when the case was last examined by the writer there was still a small amount of mobility at the joint, but it probably terminated in complete anchylosis.

CASE X. *Gunshot wound of right hip; contusion of ilium; bullet lodged, and was extracted primarily through orifice of entrance; subsequently much constitutional disturbance, and much inflammatory mischief in soft parts; exfoliation of necrosed bone; convalescent.* Reported by Act. Asst. Surgeon G. W. Baker, U. S. Army.—Private Michael Mack, Co. "K," 96th Penn. Vols. was admitted to Stanton General Hospital, June 4, 1864, for a gunshot wound of the right hip. He was but seventeen years old, and stated that the wound had been inflicted in action near Mechanicsville, May 28th, by a minie ball. It penetrated the lateral surface of the right pelvic region about two inches below the crest of the ilium, and about the same distance behind the anterior superior spinous process of that bone. He also stated that the bullet lodged and was extracted the next day, through the orifice of entrance, while he was under an anæsthetic.

When he came to the hospital, exploration of the wound with the finger showed that the bullet had struck the bone, which was bare, but not fractured. He was able to get around on crutches, and the wound presented a healthy appearance, although the contiguous soft parts were a good deal swelled and inflamed. Prescribed the ice-dressing, and suitable alimentation.

Subsequently the discharge from the wound became very profuse. The swelling did not abate, but rather increased, and became indurated in feel. The wound did not heal up. After a time he had a great deal of pain in the wounded hip. It was also noticed that he was losing colour, flesh, and strength, and he became confined to his bed. It became obvious that he was steadily getting worse. Treatment, ice-dressing, tonics, nutrients, stimulants, and anodynes, *pro re nata*.

About the 20th of August the patient's appetite failed. His tongue also became coated, and he had considerable fever, with headache, and a

frequent, quick, irritable pulse. He was very pale, and seemed to be failing rapidly. His bowels were regular. He complained much of pain in the wounded parts. Stimulants and anodynes were freely administered. The headache lasted only two or three days, and the febrile symptoms gradually became less intense, but the swelling of the wounded hip increased.

Sept. 9. An abscess of considerable size has appeared midway between the crest of the ilium, and the linea alba, and a little above the groins. He is pale, thin, weak, and exhibits a good deal of constitutional disturbance (irritative fever). Incised the abscess and ordered poultices to be applied.

18*th. Several small pieces of exfoliated bone came away from the gunshot wound.* This was followed by rapid improvement in every respect.

27*th.* Patient's general condition comfortable and favourable. The incised wound or opening in the abscess is nearly healed, but the bullet wound is still open.

Oct. 14. The parts contiguous to the bullet wound have again become swelled, inflamed, and very painful. An abscess is evidently forming near the bone. Incised it freely and evacuated a quantity of matter, which afforded great relief.

28*th.* The difficulty in the gluteal region has pretty much subsided. The discharge of pus is but moderate, and the amount of swelling but slight. The patient's general condition is excellent. The lips of the bullet wound pout as they would do if some flakes of exfoliated bone still lay behind.

CASE XI. *Gunshot wound, contusing the left tibia near knee-joint, inflicted by a glancing bullet; recovery.*—Corp. James Chaffee, Co. "I," 6th Ohio Cavalry, 20 years old, always healthy, was admitted to Stanton General Hospital, Oct. 17, 1863, from the field. He stated that he had been wounded three days before, Oct. 14, by a conical musket-ball, while engaged with infantry, near Bristow Station, Va. The bullet impinged obliquely upon antero-outer part of the head of the tibia (left) about two inches below the articular surface, and glanced off, without penetrating or fracturing the bone. The course of the bullet was from behind forward, and from without inward. Directed the water-dressing to be applied, and allowed a full diet.

Subsequently the wound granulated, but slowly. He had a good deal of pain in and about it. No pieces of bone were discharged, and the knee-joint did not become involved.

Dec. 10*th.* The wound was nearly healed, and he left the hospital on a furlough for thirty days.

Jan. 1, 1864 (about). An abscess formed in the popliteal space, and two days afterwards the wound reopened spontaneously.

April 1*st.* The wound is nearly filled up, but it presents a smooth, glazed, and indolent appearance. Its edges are blue and indurated. It is now circular in shape, and somewhat larger than a dime. Subsequently it healed slowly, and, April 24th, he was sent to his regiment for duty.

This case is introduced for the purpose of showing that even the lighter forms of contusion of bone may exert an unfavourable influence upon the curative process in the injured soft parts, causing the wound to be slow to heal, and liable to break out again with slight provocation, or even without any provocation at all. In this case the character of the injury, so far as the bone was concerned, was so slight that no exfoliation took place. There

was at no time much inflammatory trouble in the soft parts, and no evidence whatever that the osseous tissue was suffering from inflammatory irritation. There was, however, in all probability, some inflammatory irritation in the periosteum at the place of contusion; and this served to keep up an unhealthy condition of the neighbouring soft tissues.

Treatment of Contusion of Bone.—It is obvious that any plan of treatment, in order to be satisfactory, should be adapted to the pathological condition which it is intended to modify or remove. This proposition holds true with the morbid states of the osseous system, as well as with those pertaining to the other tissues of the body.

Now, it has been shown in the foregoing pages, that contusion may produce the following pathological conditions of bone: First, necrosis from interstitial hemorrhage (ecchymosis). Second, an inflamed condition of the bone, marrow, and periosteum, formative in character, and accompanied by new osseous growths, together with much inflammatory mischief in the surrounding soft parts. Third, inflammation of the bone (osteitis) more severe in character than the last mentioned, and terminating in necrosis (inflammatory necrosis). Fourth, suppurative osteo-myelitis. Fifth, gangrenous osteo-myelitis; and Sixth, exfoliation of bone, the vitality of which has been destroyed primarily by the stroke of the contusing force. It may be advantageous to consider briefly the leading points in the treatment of each of these morbid states of the osseous tissue.

Necrosis from interstitial hemorrhage (ecchymosis) may occur in any of the bones which have a cancellous structure, but it is most frequently met with in the spongy epiphyses of the long bones. These cases are always likely to prove to be very serious on account of the inflammation, which sooner or later must be kindled in the surrounding parts by the dead bone. But, if the injury chances to be inflicted upon the epiphysis of a long bone close to one of the great articulations, such as the knee-joint, the gravity of the case will be very much increased. In such a case there will be no hope of recovery without amputation. Kimm's life was saved by a timely resort to that operation (*vide* Case I.), and Pryor died, that operation having not been performed (*vide* Case II.). In other cases it may be advisable to attempt to moderate the local inflammation, by quietude, by the local abstraction of blood, by the employment of the ice-dressing in the first stage, and by the use of fomentations in the second stage, and above all by the *early employment of free incisions*, so as to prevent the burrowing of matter among the muscles and in relation with the bone as much as possible. By pursuing this course the dead bone can be extracted at the earliest day practicable, and the neighbouring parts will have sustained the least possible amount of injury.

The treatment of the simple form of osteo-myelitis, or that inflamed condition of the bone, marrow, and periosteum, non-suppurative in cha-

racter, and accompanied by the formation of a new bone, together with much inflammatory mischief in the surrounding soft parts, is attended by a serious difficulty, which arises from the fact that the pathological condition of the osseous tissue is apt to be entirely overlooked, as it was in the cases of Sted and Anderson (*vide* Cases III. and IV.), because it is masked by inflammatory mischief in the soft parts. Now, such inflammatory mischief in the soft parts is kept up through the agency of the osseous lesion. In the meantime the case may go on from bad to worse, and the surgeon wonders why it does so until he discovers the real difficulty, which lays behind the inflammation of the soft parts, and is located in the osseous tissue. Besides the local abstraction of blood, and the application of ice-dressings or fomentations and poultices, according as the one or the other of these topical applications shall afford the most relief to the patient; free incisions should be made into the inflamed parts as soon as any pus has been formed, with a view to secure its early evacuation, and to prevent any burrowing among the muscles and the deep-seated tissues. Anodynes should be administered to secure immunity from pain, and the patient's strength should be supported, especially in the advanced stages of the difficulty, by the judicious use of nutrients, tonics, and stimulants.

The treatment of acute osteitis (*inflammatory necrosis*), when it supervenes upon contusion of the osseous tissue, should be conducted upon the same general principles as those which pertain to the form of osseous inflammation considered above. Blood should be abstracted topically by leeches or cups, and ice-dressings, or hot fomentations and poultices, should be applied, consulting the feelings of the patient, and employing the one which affords most relief. It is a good plan to try the ice-dressing first, and then, if the result is not satisfactory, to exchange it for fomentations or poultices, and *vice versa*. In this class of cases long and deep incisions are generally demanded at an early day. The good effect of such incisions is illustrated by the case of Corporal Rall (*vide* Case V.). The liberal administration of anodynes will probably be demanded, and when the patient's strength begins to flag, it should be sustained by nutrients, tonics, and stimulants, *pro re nata*.

With regard to the suppurative and gangrenous varieties of osteo-myelitis, the treatment must be guided by the general principles indicated above. Cases VI. and VII. afford melancholy examples of the inadequacy of all treatment for the cure of the worst forms. But even in them something may be done for the alleviation of suffering and for the prolongation of life. The prophylactic treatment, especially in hospital practice, is a matter of the first importance. To avoid the overcrowding of the patients, to secure an abundant supply of pure air for their use, to cause them to be kept as clean and comfortable as possible should be the special duty of the surgeon, for, by so doing, he will materially diminish the opportunities for suppurative and gangrenous osteo-myelitis to occur.

The next case is introduced for the purpose of illustrating the great value of free incisions in treating contusions and contused wounds of bone.

CASE XII. *Gunshot wound of the right hip; upper part of the femur furrowed and bruised by the bullet, which lodged in the thigh; violent inflammatory reaction in the soft parts, with protracted suppuration; recovery.* Reported by Frederick Rorboak, Medical Cadet, U. S. Army.—Private Charles Wheeler, Co. F, 4th Mich. Vols., aged 19, was wounded at Spottsylvania C. H., May 10th, 1864, by a musket-ball, which penetrated the right hip and lodged deeply in the thigh. He was admitted to Stanton General Hospital May 13th for treatment. The wound was inflamed, and the thigh was swelled, hot, and tender. Exploration of the wound showed that the bone was injured, but the bullet was not discovered. The ice-dressing was applied to the inflamed parts. The swelling of the thigh, however, did not abate, and the wound suppurated freely. During the latter part of May the patient's condition grew worse instead of better.

May 31. The injured limb is much swelled and inflamed. The wound discharges a thin, dirty-looking, stinking pus. It was judged to be expedient to explore the thigh in a more thorough manner than on previous occasions, with a view to ascertain the precise character of the bone-injury, and to extract the bullet if possible. Accordingly, an incision four inches in length was made on the outside of the thigh, from the great trochanter downwards, and penetrating to the bone. This enabled us to find that the bullet, which, having entered the hip two inches above and behind the trochanter major, had passed downwards, forwards, and inwards to a great distance in the soft tissues of the thigh, had also torn a groove on the surface of the great trochanter and the upper part of the femur, and bruised the osseous tissue. A careful and thorough search for the bullet was instituted; both the fingers and the porcelain-tipped probe of Nélaton were employed, but without success. The patient was labouring under an attack of rubeola when this operation was performed. Prescribed the water-dressing for the wounds, quietude in bed, with nutrients, tonics, and stimulants internally.

The character of the discharge from the wound was speedily improved, and the inflammatory action in the soft parts began to abate. Afterwards several small pieces of bone separated and came away from time to time. They were as thin as the finger-nail, and varied in breadth from an eighth to a quarter of an inch. Towards the end of August he began to leave his bed and to walk about on crutches.

Sept. 13. His general condition is good, his appetite and spirits excellent. Both the bullet-hole and the wound of operation are almost healed up, and present a healthy appearance. The amount of discharge is small and laudable in character. He can bear his weight upon the injured limb, by pressing upon that knee with both hands, so as to prevent it from gliding forward through debility on the part of the extensor muscles of the leg.

The writer fully believes that this man would have gradually wasted away, and died worn out by the protracted suppuration and by the irritation of the system at large set up by the morbid condition of the bone and the neighbouring soft parts, an unfortunate result which befell several of our cases, if he had not been treated by free incisions. Indeed, as it was,

he got very much reduced at one time, and there even came to be much doubt as to his recovery. It is also probable that if the treatment by incision had been commenced at an earlier day, the patient would have been rescued from much suffering and peril, for, by this practice, judiciously employed, the extension of the suppurative process among the deep tissues of the thigh could, in a great measure, have been prevented.

With regard to the treatment which may be required by the exfoliation of osseous tissue whose vitality has been destroyed by the direct action of the contusing force, the first indication is to moderate, and keep under control the inflammatory excitement in the adjacent or contiguous tissues, whether osseous or soft, which the dead bone, acting as an irritant, will be likely to kindle. For such a purpose quietude, together with the ice-dressing and a spare diet, will generally suffice in the light cases, but the severe ones will demand also the abstraction of blood by leeches or cups, and the internal use of the cooling saline draughts, with opium in some form to allay pain. If any matter forms, it should be evacuated without delay. When the dead bone becomes detached it should, as a general rule, be extracted as soon as possible. Concerning the treatment of this form of exfoliating bone, reference may be advantageously made to Cases VIII., IX., and X. This form of necrosis becomes most dangerous to life when it rouses *a suppurative inflammation of the osseous or of the medullary tissue.* Illustrations of the fatal character of such osseous inflammation are not unfrequently furnished by the occurrence of suppurative inflammation of the diploë and consecutive thrombosis of some of the sinuses of the brain, while a contused patch of the cranium is being exfoliated. To prevent such unfortunate results, the prophylactic treatment of this class of cases becomes a matter of the first importance. These patients should not be crowded together, nor placed in a contaminated atmosphere. They should be provided with spacious and well-ventilated quarters. They should also be kept as clean, quiet, and comfortable as possible. By doing this, the surgeon accomplishes a great deal for the prevention of the destructive forms of osseous inflammation which sometimes follow contusion.

The following is, in some respects, a very instructive case:—

CASE XIII. *Contusion of the right tibia near its upper extremity, from the kick of a horse; exfoliation of necrosed bone; recovery.* Reported by Acting Asst. Surg. Charles H. Osborne, U. S. Army.—Corp. James H. Stewart, Co. H, 1st Vermont Cav., aged 22, was admitted to Stanton General Hospital, August 15, 1864, for an injury inflicted by the kick of a horse, which had bruised the right leg a short distance below the tubercle of the tibia, and produced a small abrasion of the cuticle. This was scabbed over, but it was also surrounded by a bright-red areola of inflammation about an inch in width, measuring from its inner to its outer margin. His general condition was poor, and he showed the usual symptoms of malarial poisoning. He did not complain of any pain other than a moderate amount of soreness. The water-dressing was applied, and full diet with stimulants allowed.

By the third day after he came to hospital the scab was removed, and a small ulcer with raised edges and pale granulations was exposed to view. Argenti nitras was applied, and the dressing was changed to unguent. resinæ. Tinct. ferri sesquichlorid. was added to the internal treatment.

The ulcer remained in the condition above mentioned, showing no tendency to heal until Sept. 1st. At this date he took a chill, his tongue became coated in the centre, and red and cracked at the tip and edges. Fever of a low type followed. His bowels inclined to be constipated, and were relieved by laxatives. The swelling of the leg increased, the ulcer assumed a phagedenic character, extending rapidly and discharging a thin pus. Nitric acid was applied to it, quinia, iron, opium, gr. j, every four hours, and stimulants were administered internally. From this time the fever gradually abated. After a time the slough separated and healthy granulations appeared. *A small flake or lamina of bone, about the size of the little finger-nail exfoliated and was removed.*

Oct. 12*th.* General condition much improved; appetite and spirits good; the ulcer is about an inch in diameter, healthy in appearance, and secretes a laudable pus. It is granulating rapidly and beginning to cicatrize.

18*th.* He is almost well; and able to undertake a journey of several hundred miles. He was transferred to General Hospital in his own State to-day.

This man's attending surgeon, Dr. Osborne, was not fully satisfied that the case belonged to the same category as osseous contusion, until the exfoliation of bone took place.

It is probable that the sloughing was principally due to an effort on the part of nature to secure a free aperture of communication with the bruised periosteum and bone, at an early day. Would not this patient have been benefited by a free incision down to the injured bone, made with the knife, when the bruise commenced to slough, or even prior to that time? Ought not the surgeon to take his cue from nature in such cases, at least so far as this point in the treatment is concerned?

An analysis of our cases yields the following results with respect to their causation, viz., in six of them the injury of the osseous tissue was produced by spent bullets, and in each of these six cases the bullet either lodged or was accidentally withdrawn through the orifice of entrance; five cases were hurt by glancing bullets; one was injured by a grazing bullet; and one by the kick of a horse. It is fair to suppose, also, that in at least some of the six cases wounded by glancing and grazing bullets, the projectile was not moving at anything like its maximum rate of speed. Now, this coincidence between the occurrence of contusion of bone and a greatly diminished velocity on the part of the projectile inflicting it, is certainly remarkable. It is also a fact of practical value to the military surgeon. It will lead him to anticipate serious consequences in all cases where a spent bullet has struck a bone, and to make timely preparations to meet them.

With regard to the influence of the state of the constitution upon the results of contusion of bone, it should be stated that all of our cases occurred in the persons of soldiers in the prime of manhood, and free from

constitutional taint in any form, that none of them were old or otherwise broken down, and that but three of them were at all debilitated at the time of injury.

With regard to the results, it should be stated that of the thirteen cases (this enumeration of course embraces the one kicked by a horse), one suffered amputation of the thigh, five died, and seven made more or less complete recoveries. This certainly exhibits a high rate of mortality, and serves well to illustrate the serious character of the lesion.

It has been stated incidentally that the pathological conditions of the bone produced by contusion are apt to be masked by the swollen and inflamed state of the overlying soft parts, so that the osseous lesion may escape notice for some time. This happened in no less than three of our cases, and it should serve as a warning to all surgeons to be vigilant while treating this class of cases.

The facts and observations set forth in the preceding pages have shown at least some of the serious consequences which are produced by contusion of bone. It could scarcely be expected that all of them would be successfully pointed out by any one surgeon, however extensive his experience in osseous pathology may be. But enough has been shown at least to indicate that any injury of bone in the nature of a bruise, however trivial it may appear to be at the time of infliction, may be followed by serious consequences, which it is the duty of the surgeon to anticipate and ward off if possible.

HEAD-QUARTERS ARMY OF THE POTOMAC, March 22d, 1865.

ART. II.—*Diphtheria, as it prevailed in Accomac County, Va., and its most Successful Mode of Treatment.* By EDWIN W. LE CATO, M. D.

EARLY in the autumn of 1863 the lower portion of Accomac County, Va., was visited by an epidemic entirely unlike anything that had previously prevailed, and consequently most of us were wholly unprepared to decide upon its character or how to treat it. In the beginning, a few of the profession believed it to be tonsillitis, others, putrid sore throat, ulcerated sore throat, &c.; and not a few cases occurred before the true character of the disease was fully understood. But the great fatality of the malady soon convinced those who were in doubt, that the disorder was widely different from the anginose affections prevalent in this part of the world. It is now admitted by all to be what it really is—diphtheria.

The popular belief that the disorder was eminently contagious caused for a while much consternation in the community, greatly abridging social

intercourse where the disease happened to be prevailing. In some cases the fear of it was so great that the friends were compelled to perform the last sad rite of interment.

Not having any statistics of the actual number of deaths caused by diphtheria since its advent among us, it is impossible to give the exact mortality it occasioned, but certainly not less than two hundred persons, mostly children, have perished by the disease.

The district of country over which the disease extended does not exceed an area of fifteen or twenty miles square; and within this small compass it has continued its ravages without any seeming disposition to overleap the boundaries. Its limitation to this area is certainly not because the hygienic conditions of the adjoining country are better, or due to atmospheric influences. Neither can the disorder be satisfactorily referred to any known local causes, such as occupation, habits, &c., for throughout the peninsula they are similar. It is true that in the most sickly localities, that is, in the necks of land formed by the numerous small streams which extend for two or three miles up in the interior, diphtheria has been most prevalent and fatal; but why the materies morbi, whatever it may be, should exist in one neck and not in another separated only by a small stream not exceeding more than one-fourth of a mile in breadth, is a question which in the present state of our knowledge no one can answer. The disease has been supposed to originate in noxious emanations from the decomposition of animal and vegetable matter, uncleanliness, want of proper aeration of the blood, and various other causes. No doubt these predispose and render persons and communities more liable when the disorder is already prevailing, as will any agent which can depress the vital forces of the system; but it cannot be consistently referred to such causes, I think, because they have existed from time immemorial, and formerly to a greater extent than at present, and yet have never before produced diphtheria.

Diphtheria is evidently a blood disease, the result of a deadly poison circulating in the blood, and consequently affecting the whole body, but expending its greatest power on the nervous system. The disease, however, has been regarded "not as a disease sui generis, but rather as many diseases alike only in being associated with the common characteristic formation." This view, I think, is rather untenable, for we are constantly meeting intercurrent affections in almost every disease. In enteric fever we encounter pneumonia and bronchitis; in variola and rubeola we have the same complications, and, in other cases, various admixture of diseases. I hardly think we would be justified in supposing these disorders to have no claim to distinction or separate consideration, because they are so frequently associated with each other.

Diphtheria is more likely to affect persons whose powers of resistance are naturally weak, or have become so by previous disease or debilitating influences; hence, perhaps, the greater liability of children and females.

And this may also in some degree account for its frequent attacks in the course of other disorders. But by far the largest number of cases as it prevails here are peculiar, and present the same uniform symptoms, which are sufficient to entitle it to consideration as an idiopathic affection. The odour which generally accompanies it; the small, frequent, thrilling pulse; the marked debility that quickly follows the attack, and the suddenness of all these symptoms, will oftentimes enable us, unless the case is very mild, to diagnose diphtheria before looking at the throat.

The disease, as it occurred here, presented two forms, both having the same origin, but differing in degree or intensity. For the sake of convenience, I may be permitted to designate them spurious or false diphtheria, and true diphtheria. In spurious diphtheria, the constitutional symptoms are generally slight—some acceleration and feebleness of the pulse, general malaise, slight muscular pains, some enlargement and moderate tenderness of the glands about the throat, and inflammation of the fauces were the most prominent symptoms. The tonsils were sometimes swollen, sometimes, on the contrary, their size was normal, but they generally present a dark red color. The uvula is very generally elongated, often clubbed, and œdematous. The digestive organs were not materially disturbed, though much less was taken into the stomach, owing to the pain induced by attempts to swallow even liquids. There is no exudation to be seen anywhere in the throat, and this is the distinguishing feature between the true and false. This form of the disease attacks adults principally, and is never fatal. It seems to be the result of an abortive action of the poison, the consequence of partial dilution, or the energetic resistance of the vital powers to its operation. The only thing peculiar about these cases was their obstinacy. They would run on for two or three weeks and longer without much change, under the ordinary remedies for angina; but, on the other hand, were speedily arrested when treated as diphtheria. These cases prevailing, as they do, at the same time and in the same family, and cured by similar treatment as true diphtheria, are doubtless caused by some modification of the same toxic agent. There is, however, no positive proof that this is so, and such an opinion can only be sustained by concomitant circumstances.

In true diphtheria the case is different. Here the attack almost invariably commences with a chill of considerable severity; sometimes, however, chilliness and heat alternate until fever is fully formed. The tongue is early covered with a white or yellowish-white fur, through which the enlarged papillæ can be seen giving it a somewhat peculiar appearance. The bowels were sometimes constipated, but usually there is a strong tendency to looseness, and cathartics were seldom needed after the beginning. The pulse was generally small, vibrating, and compressible, and ranged from 90 to 120 or 30. The throat was the principal source of complaint, and the pain in it was greatly increased by speaking or during the act of degluti-

tion. The submaxillary, parotid, and cervical glands in bad cases were very much enlarged and extremely tender to the touch. Debility was a marked feature in the disease, and the patient early experienced difficulty in locomotion. The countenance presented a rather sunken aspect, and the colour of the skin was of a slight dingy yellowish hue, which seemed characteristic. There were many mild cases, however, in which these symptoms are not so strongly marked. If the throat was at this time examined, large ashy deposits of false membrane could be seen on one or both tonsils, uvula, or velum palati, and, sometimes, covering the whole faucial region.

Earlier in the attack the exudation was more limited and was confined to a single small spot; but it spread with the greatest rapidity unless checked by appropriate remedies. The uvula was elongated, and very frequently completely covered by the exudation. In one case it extended so far down the pharynx that it gave the patient, an adult negress, the greatest amount of uneasiness by constantly exciting the muscles of deglutition. The exudation was generally confined to the throat, but sometimes extended to the Schneiderian membrane, and blocked up entirely the nasal passages. Not unfrequently it extended forward, and was deposited on the outer edge and under surface of the tongue. Occasionally, but much less frequently, it invaded the larynx and trachea, and then was extremely intractable and fatal. Happily this extension did not often take place. Blistered surfaces about the throat were apt to become covered with a sloughy looking exudation. A mishap of this kind occurred to a patient of mine, a little girl, aged six years, who had an extensive burn on the posterior surface of the body and extremities. The wound, though a severe one, was doing pretty well, until about four weeks after the accident, when she was suddenly seized with diphtheria; the wound immediately lost its healthy appearance, and in a short while became the seat of a yellow exudation similar to that in the throat. She became pulseless, and died within forty-eight hours. It would seem, then, that the exudation is not limited to mucous tissues or surfaces, but that it might be deposited on any denuded surface of the body.

The above symptoms are such as usually attend a tolerably severe case of the disorder as it prevails here. But they occur in every possible degree of severity, from the mildest to the most malignant, and point to a serious constitutional malady rather than a mere local one.

In regard to the treatment, much discrepancy of opinion for a while prevailed. The antiphlogistic plan, such as leeching, blistering, and calomel, with the local application to the throat of the solid stick of nitrate of silver, were tried until the great fatality of the disease demonstrated their utter futility.

These remedies were then dropped, and various gargles and poultices tried with but very little better success.

The remedies that have been most successful here, and upon which the greatest reliance is to be placed are: quiniæ sulph.; potass. chlor.; ferri tinct. mur.; and argent. nit. Their value may be estimated by the order of enumeration. These have again and again been brought to the notice of the profession; but as they seem unjustly falling into disrepute, I shall give, somewhat in detail, the method I have adopted, and which has been successful in about one hundred and fifty cases, failing in three only—one complicated with an extensive burn, and two others with pertussis. These were all cases of true diphtheria, and most of them severe.

In the first place, then, in the beginning of the disease, if there should be torpidity of the liver with constipation of the bowels, a purgative dose of calomel and rhubarb should be given. If, on the other hand, there is some looseness, the calomel should be combined with pulv. Doveri, and given to stimulate the alimentary secretions, and prepare the patient in some degree for what is to follow. Three or four hours after the administration of the above, a pill, containing from one to two or three grains of the sulphate of quinia, should be given (to adults), and alternated every two or three hours, according to the urgency of the symptoms, with the following mixture: ℞.—Potass. chlor. ʒij; ferri tinct. mur. ʒijss; aquæ ʒij; a tablespoonful, diluted at the time of administration with an ounce or two of water, and this may be sweetened with white sugar to make it more palatable to children. For them, the dose must also be diminished in proportion to the age. These remedies must be given alternately, and must be continued day and night until some amelioration takes place in the symptoms. The quantity of quinia given in any case must be regulated by its effects on the brain. It should be given in as large doses as can be borne without causing too much cerebral disturbance, and be steadily continued until the membrane begins to be detached, and then at longer intervals or in diminished doses until the throat is clean, when it should be discontinued, and the mixture alone given until convalescence is pretty well established.

As a topical application to the throat there is nothing better than the nitrate of silver, which should be used in a solution of not more than six or eight grains to the ounce of water, and be applied twice daily by means of a camel's hair pencil or small mop, made by fringing linen, and attaching it firmly to a stick slightly curved at the extremity. This is a gentle lotion, and is just what is needed to stimulate the parts to healthy action. A cauterant is not indicated, and if applied, will often do injury, and the frequent use of nitrate of silver in stick cannot be too strongly condemned. Externally the volatile liniment is useful, and may be applied twice a day, and any degree of irritation can be kept up by a piece of flannel worn around the neck. The tincture of iodine is also a good counter-irritant, and should be preferred when the glands are much enlarged and indurated. Blisters are extremely pernicious, and should be entirely discarded from

practice. They greatly distress the patient, without in any way favourably affecting the disease; and they very frequently become gangrenous and unmanageable. The daily use of the warm bath is productive of much benefit, and should not be omitted. There is another therapeutic agent which must never be forgotten—pure air! Much harm has often been done by confining patients in close rooms, and excluding as much as possible the external air under the impression that cold will be taken. No greater mistake than this can be made. The patient should have free access to pure air, either by thorough ventilation or by changing from room to room, and airing well the vacated apartment against his return to it. The diet should be nutritious, consisting of fresh milk, rich soups, custards, and the like; and when the appetite is abolished, provided the stomach is retentive, small quantities of food must still be given at stated intervals, to sustain the patient and prevent the inevitable tendency to asthenia. It will often be necessary to resort to stimulants, such as brandy, or brandy and milk, for the same purpose. With these remedies early resorted to, very few cases proved fatal here. The treatment of diphtheria, to be successful, must be energetic from the very beginning. It will not do to give a little potass. chlor., and be content because the case is mild, and there seems to be no indication for other remedies. I know that the practice of resorting to these measures in mild cases, and in such as appear to be accompanied by some sthenic action, has been strongly condemned. We are told that it is time enough to give a remedy when the proper indication arises, that is, to wait for anæmia before we give iron, and for the debility before having recourse to quinia. This, in my humble judgment, is a great error—one that has often entailed upon the patient a long train of evils, and frequently cost him his life. The constant tendency of diphtheria is to asthenia, and life is either destroyed in this way or by an extension of the pseudo membrane to the larynx and trachea. By prompt, energetic action both these calamities may be averted. I have never seen this plan do harm, or in any way aggravate the symptoms however sthenic it might be, but, on the contrary, have invariably seen the pulse reduced in frequency, the countenance brighten, the local symptoms improve, and the extension of false membrane prevented by this course.

The sequelæ of diphtheria, as it prevailed here, consisted principally in paralysis of the vocal organs and slight functional disturbance of vision. This happened almost as often after mild cases as after the most malignant, and seemed to bear no direct ratio to the severity of the case. These symptoms generally come on during convalescence, or a week or two after the subsidence of the disease, and are, or were not of a very persistent or serious character, usually disappearing in a few weeks under the influence of tonics, and moderate exercise in the open air.

The above, I am aware, is an imperfect sketch of diphtheria. It is only intended as an account of it as it prevailed here. As before stated, it has

been my good fortune to have lost but few cases; this I attribute wholly to the early and persistent administration of supporting remedies in the manner already indicated. It may be said that the type of the epidemic was more mild and less malignant here than elsewhere. But this, I think, is sufficiently controverted by the number of deaths caused by the disease.

ART. III.—*On the Mountain or Continued Miasmatic Fever of Colorado Territory.* By F. RICE WAGGONER, M. D., A. A. Surgeon U. S. A.

IN calling the attention of the profession to this form of fever, I do not wish it to be regarded as a new disease, but as an old and well-known malady of an unusual type, and, so far as our knowledge extends, purely occidental, and indigenous to Colorado and the Rocky Mountains, extending to Montana northward, and the Pacific westward.

During a four years' residence, during which I was engaged partly in private and partly in military practice, I have treated a full score of well-marked cases, and, without claim to skill or originality, I may say that I have resorted to a plan of treatment more successful than that hitherto employed by the practitioners of this section.

Mountain fever is the scourge of our pioneer miners, and its attack is regarded as next to fatal, either from a misapprehension of its nature and a wrong application of therapeutics by the profession, or from the proper remedial agents not being pushed far enough to secure their specific effects.

CASE I. Mr. W., aged 45, by occupation a farmer (rancheman), low stature, muscular, bilious temperament, had been exposed to much inclement weather and wet in the irrigation of his lands. Was attacked Sept. 29, 1862, with headache, daily increasing in severity, followed by general lassitude, listlessness, indifference to all things and persons around him. On the fourth day (Oct. 2) he applied to me for advice. His tongue was coated with rather a light bilious fur; bowels constipated; want of appetite, with slight tenderness of the epigastrium; tension and heaviness of the stomach. In fact, up to this time all the premonitory cerebral symptoms had been periodical in their character, these being generally aggravated from 10 A. M. to 6 P. M., when they subsided more or less, and the patient rested comparatively well during a portion of the night. But each day brought aggravated symptoms, and at the time he came under my notice he was ready to succumb to the long and tedious fever. I ordered him the following: R.—Hydrarg. submur., radix rhei pulv., āā gr. x; podophyllin gr. ss. M. ft. chart. ij. To be taken at 6 and 7 P. M. During the night it operated quite freely. Slight diaphoresis ensued.

Oct. 3, 10 A. M. Tongue more thickly coated, fur darker brown; pulse 100, rather weak and compressible; skin dry, but not harsh; eyes sunk and watery; no appetite; much thirst; tenderness of epigastrium increased,

but no irritation of the stomach; urine scant and high coloured; indisposition to move; never speaks unless spoken to. Dover's powder ordered in full doses, with an excess of ipecac.

4th, 10 A. M. Patient much the same, though symptoms had modified a little during the previous evening; but in the after part of the night had increased with the development of the day, as usual. Now there was slight delirium; he could tell but little of his previous night's rest. Pulse increased to 110, and correspondingly weaker; tongue more dry; in fact, all secretions were locked up; bowels had not been moved for thirty-six hours. Saline cathartic ordered. Spt. nit. dulcis, with two drops of tinct. veratri viridis, every two hours.

5th, 11 A. M. Has again a slight increase of symptoms generally. Cerebral complication was evidently becoming much aggravated, though there was no turgescence of neck or face, but, on the contrary, they were rather pallid. Cold applied to head. Spt. nit. dulc. was ordered, with sponging of the whole surface with soda water, which gave evident pleasure to the patient.

Thus my first case progressed from day to day. Quinia was given twice, twenty grains in twelve hours, within the first ten days, but with no effect. The cerebral disturbance much the same as in typhoid fever, but the other characteristics of that disease were absent; on the contrary, there was an habitual tendency to constipation throughout, and no tympanitis, epistaxis, or petechiæ.

The treatment was directed to keeping the bowels open and increasing the secretions generally. Now and then a mild mercurial, supported by beef-tea, a little wine, bark, etc. The pulse throughout was feeble and frequent. His attack lasted forty days, and then gradually convalescence took place, with an amelioration of all the symptoms. For forty days he remembered nothing that transpired, though at all times he was perfectly governable and obedient to his nurse, and we congratulated ourselves on its safe termination, though it did take forty days to accomplish it, the disease having been generally fatal.

I saw no other cases of like type until the fall of 1863, when, having entered the army medical service, I was stationed at Fort Lyon, C. T., on the Upper Arkansas River, about one hundred and fifty miles from the base of the mountains. The location is on the north bank of the river, on a low bottom, though above high water. The other side of the stream is yet more unfavourable to health, overflowing many thousand acres of land that support a perfect wilderness of grass, weeds, and creepers.

The summer was very warm; for weeks the thermometer indicated daily from 95 to 100 degrees, and was ultimately as high as 105 degrees.

We had in July and August a number of violent rain-storms, that flooded the earth for a few hours; but the soil being very sandy and loose, the water soon disappeared. The men were quartered in stone buildings with flat dirt roofs, that admitted the rain almost as readily as a sieve. On my recommendation, the commanding officer had them removed to the open field in tents during the remainder of the rainy season; but on returning to their quarters, these were found damp, and, I think, were influential in the development of the diseases that quickly followed; and, strange to say,

matters of such paramount importance are entirely overlooked by the department, while minor affairs received deliberate and grave consideration.

During the summer months the health of the troops was good, not more than two or three per cent. of the command were sick per month. However, September ushered in a new state of affairs, though nothing serious, yet an indicator of what was to follow. Out of a garrison three hundred strong, we had some ten cases of intermittent fever, two of remittent, and as many of diarrhœa and dysentery. The febrile cases yielded readily to quinia—gr. xx for intermittent, and gr. xxv for remittent; this, with proper preparatory treatment, generally sufficed.

The diarrhœa was checked by a full dose of sulph. magnesia, followed by opium and pil. hydrarg. mas. The dysentery was treated by sulph. magnesia in ʒj doses every three hours, until a change was effected in the character of the stools. Occasionally a pill of opium was given after the above result was accomplished, always anticipating the next discharge with rather a full portion of the magnesia; cold water injections were used freely. I would state, *en passant*, that the saline treatment has succeeded admirably in my hands in chronic diarrhœa contracted in camp.

October brought us a type of fever identical with the case above narrated, differing only in being of rather a lower grade, with more soreness and tension of epigastrium and irritability of the stomach; many patients presented themselves with the characteristic soreness of the stomach, lateritious urine, general lassitude, and indisposition to help themselves, but would be returned to duty in a few days, quite well, after taking twenty to thirty grains of quinia, a mercurial cathartic, etc. Such cases, however, were of frequent occurrence through the month of September. I attributed to all these cases the same etiology.

My first two cases of the continued type appeared early in October, and were treated after the fashion of the first case above, and persisted for varying periods of thirty and thirty-five days before any marked signs of convalescence, and then twenty days more before the patient gained strength sufficient to walk one hundred paces from the hospital without fatigue. As I had no one to consult with, I determined after this to change my tactics, and resolved to push quinia until I obtained some marked effect. Although I was fully aware that in those cases, during the prevalence of febrile action, the use of quinia is forbidden by many authors and condemned by a large and respectable portion of the profession, yet I was not deterred, since it seemed to me that as the disease yields so readily to our great agent in milder forms, why might it not do so in its more aggravated ones, if the remedy were pushed proportionally?

I had not long to wait for other cases. Those patients which were to be affected with the continued type were recognizable at first glance when they entered the surgery, if they were not carried from quarters to hospital

on litters. Yet some presented themselves while they were able to be on their feet.

The cases of the continued type all presented an icteroid appearance, dejected countenance, eyes sunken and hollow, epigastric tenderness, urine highly coloured and scant. Delirium soon came on, and, as a general thing, in two or three days the "brave soldier boy" lost all consciousness of his whereabouts.

The most assiduous observation failed to detect any remission of the fever either by day or by night. The leading symptoms that now ensued were delirium; constipation, slight but not serious; gastric derangement; first a light, but later a dark furred tongue, though never concave and excoriated as in typhoid cases. Pulse from 120 to 130, usually small and weak; rarely any vomiting—if any, readily controlled; no enteric complication or tympanitis; hot skin, thirst, immoderate and continued burning fever.

It has been stated that this state of affairs was preceded in September by intermittents and remittents of ordinary type and grade, which readily yielded to not over large doses of quinia. Though perhaps some of our brethren may think twenty-five grains quite large, when given without special regard to remission of the fever, in five grain portions every two hours, I resorted to that practice.

CASE II. Henry W., private Co. K, 2d Cavalry of Colorado, admitted in hospital Oct. 20. Age 30 years; not robust, but rather stoutly built. On examination, presented all symptoms just detailed. Had only been indisposed about twelve hours. Ordered the following cathartic: Calomel gr. vj; podophyl. gr. ss. M. ft. chart. ij, to be given at 9 and 10 A. M. and at 6 P. M. It operated well.

Oct. 21. Bowels had been moved three times from previous cathartic. Fever quite high; confused ideas; delirium evidently approaching. Ordered salines, cold to head, and veratrum viride.

22*d.* Patient delirious; pulse 120; no veratrum had been given for twelve hours, patient having vomited, the nurse had discontinued it. Continuation of cold application to head. R.—Sulph. quiniæ gr. xxx; Dover's powder, gr. x. M. ft. chart. v, to be given every two hours.

23*d.* Patient worse; delirious; pulse about 130; no movement of bowels since evening of 20th. Ordered a full dose of calomel and podophyl. Late in evening operated twice.

24*th.* Ordered quinia gr. xl; sulph. morphiæ gr. ss. M. ft. chart. vj, one to be taken every two hours.

25*th.* Unchanged. Ordered sixty grains of sulph. quiniæ in five portions every two hours. Stomach by this time had acquired a perfect tolerance for anything. I know that this was heroic treatment, but was fully persuaded that the disease must yield to it. Doubtless a more timid practitioner would have desisted after forty grains had failed to produce any effect, yet I was determined to persist; and not until after the sixth of those ten-grain doses was taken, and after fourteen hours, did I obtain a truce. At this time my patient commenced to sweat, and as the night advanced, diaphoresis increased. I directed he should be kept well covered with blankets during the

night, for at this season of the year the nights had become rather chilly. The effect was decided. Next morning at eight o'clock, on entering the ward, I found my patient perfectly rational, and on interrogation as to how he felt, he exclaimed, "Bully!" He had no fever; his pulse was full, and but little above the natural standard; his clothes and the sheets where he had lain were thoroughly wet. Convalescence was rapid and most perfect.

CASE III. Corp. S., Co. K, 1st Cavalry of Colorado, aged 28 years; muscular and stout. Admitted Oct. 28. Symptoms same as in Case II. Ordered cathartic of calomel and podophyllin, which operated well during the night.

Oct. 29. Ordered sulph. quiniæ gr. l in six portions every two hours.

30*th.* Found patient no better, but growing worse as time progressed; delirious; passed a very restless night; pulse 120; skin dry; but slight irritation of stomach. Nurse thought he had vomited last quinia powder of previous evening. Bowels not moved since evening of the 28th. Ordered rad. rhei, with small amount of calomel and podophyl., with cooling drinks, and cold water to head.

31*st.* Bowels moved freely during the night, but patient no better, and no signs of remission.

Nov. 2. Ordered eighty grains of quinia in eight portions, one every two hours. Being rather more muscular than Case II., and symptoms more aggravated, determined to go to maximum at once, but gave directions, if any signs of remission appeared before all had been given, to leave off quinia at once.

3*d.* Seven portions had been given when sweating commenced, and continued the remainder of the night. Patient has entire remission of all symptoms. Tongue moist; pulse full and about 95; no delirium; offered him a little nourishment, which he took with some degree of relish. Convalescence perfect in a week's time.

These are samples of some twenty cases treated in like manner and with like results. No case yielded with less than sixty grains, and seventy-five was not exceeded in one day; and in no case did any unpleasant symptom follow, but most perfect convalescence.

It would be extending this paper too far to detail all the cases, and as these two are complete samples of the type of fever, and my treatment being the same in all, I think them sufficient. During the remainder of the fall I continued this practice, and did not lose a patient, all being promptly relieved by the early administration of quinia. In fact, a large majority never reached the febrile stage, which doubtless would have proved long and tedious had it not been for early treatment; only the two cases run their limits of thirty-five and forty days. As winter came on, this type disappeared, and nearly all the garrison that had escaped fever were affected more or less with jaundice, which affection yielded readily to blue pill and podophyllin. Podophyllin I consider a valuable adjuvant to mercury, the mercury depriving it of its drastic properties. It may be asked, Were the secretions yet dormant when the quinia was administered? I answer, yes. They were affected but little by the mercury first administered.

But in this I consider quinia one of the best cholagogues we have, not immediately, but secondarily. In every case, as soon as the fever was broken up, all the secretions, including that of the liver, at once commenced to flow.

My first case occurred in the mountains, where the weather is always cool, remote from any malarious district, and was very prevalent in 1859, the first year of my Territorial residence, and practitioners of that early day informed me that it could not be cut short, though they acknowledged they never pushed quinia beyond an ordinary dose. By the time I met my first case (narrated above) it had become very rare in that region. Doubtless it depended at an early day on the exposure and insufficient diet of our mining community, and, I think, would have yielded to large doses of quinia (from sixty to eighty grains), if any one had had the nerve to administer it.

Fort Lyon, as I have stated, is located favourably for miasmatic fevers, and I anticipated those affections on my arrival, and they came.

The question is in this country, Is it purely miasmatic fever, or a modified typhoid? I had been taught by my pioneer brethren that it was typhoid, without the enteric symptoms. But, accepting Prof. George B. Wood's theory that typhoid is enteric fever, and that typhoid dependent on ulceration of the glands along the track of the small intestines, which is undoubtedly the true state of affairs, and that typhoid without it is not typhoid, I called mountain fever continued miasmatic, and if miasmatic, it must yield to quinia if pushed to the degree corresponding to the malignancy of the type. It had been my habit, while practising in one of the Western States, to administer quinia in all bilious and remittent cases, with but little respect to the presence of fever, deeming that no contraindication to its use, as taught by most writers. I was taught to do so in my pupilage, by my preceptor, Dr. E. Penwell, a practitioner of undoubted skill; hence I had no hesitation in the administration of quinia in these malignant cases where a remission could not be obtained.

FORT GARLAND, C. T., Feb. 1865.

ART. IV.—*Pepsine Wine—a New Preparation.* By J. C. REEVE, M. D., Dayton, Ohio.

I AM desirous of laying before the profession my experience with a preparation which, although limited in the range of its application, is of no insignificant value among our means of combating disease. It was first proposed by Dr. Geo. Ellis, of Dublin, in the *Medical Times and Gazette* for July, 1862, under the name of "rennet wine," a term for which I pro-

pose to substitute that given above as at once more appropriate and more scientific. It is a vinous infusion of the calf's stomach, or rennet; such an infusion has been proposed before, but so little was known of it, and there being nowhere any definite instructions for making it, this may justly be called a new preparation. The peptic principle of the gastric juice is its active agent; who first proposed using this product of the animal economy as a medicine it is impossible to say (*U. S. Dis'y*, ed. 1865, pp. 1590–92), but its value as an aid to feeble digestion is substantiated by a large amount of respectable professional testimony, and has ever been a matter of popular observation. Pepsine itself has been for some time a standard remedy in European practice, but pepsine is the product of delicate chemical manipulation, and, so far as a remedy is concerned, cannot be obtained in this country out of the larger cities, and is unreliable when obtained. This preparation it is, therefore, believed will supply a desideratum by affording a cheap and convenient mode of obtaining and administering a valuable remedy, too little used because difficult to procure.

The medicine is easily prepared. A fresh rennet is obtained from the butcher, cut up into small pieces, and put into a pint of good sherry wine; after maceration for two weeks it may be strained off, and is ready for use. A ready test of its strength is to stir a teaspoonful into a teacupful of milk warmed to blood heat; this it should turn to the consistence of blanc mange.

The influence of pepsine in promoting digestion being granted or proved, the cases in which this wine will be beneficial are clearly indicated. Cases of feeble digestion depending upon debility of the stomach, this debility being either constitutional or the result of protracted and exhausting diseases, are particularly fitted for the use of the remedy. Dr. Ellis, the originator, recommends it for dyspepsia, apparently giving it without any selection of cases in regard to character or pathological conditions, and there is no doubt that it will yet take its place among the standard remedies for this obstinate and distressing complaint. He states his experience with it as having been very considerable and his confidence in it great. He has also used it with good effect for offensive odour of the breath in young persons. In one case cod-liver oil was tolerated and digested by its aid which could not be taken before. Another physician writes to the same journal of the benefit he derived from it in obstinate attacks of gastralgia, to which he was subject.

My own experience with the preparation extends over more than two years, and I have prescribed it pretty freely. My opportunities for using it in pure dyspepsia have not been numerous, but it has not disappointed me of affording relief in a single instance of the kind. For weak and anæmic females, with whom the stomach partakes of the general feebleness of the body, and lacks the power to digest the nutriment so much needed, I have found a teaspoonful of the pepsine wine taken after each meal a most excel-

lent remedy. The most striking benefit I have yet seen from it in adults was the case of a young lady who came under my care in an extremely feeble and emaciated condition, the result of a severe attack of typhoid fever. So great was the weakness and irritability of her stomach that the most carefully selected and prepared food could not be borne; a single spoonful of beef-essence, given ice-cold, almost constantly produced vomiting. The usual remedies for such a condition had been exhausted without effect when I recommended half a teaspoonful of the wine after every spoonful of food. The effect was marked and striking, and the agency of the medicine proved to the satisfaction of all by attempts to intermit its use.

But it has rendered me the most service in a class of cases which yield to none in the anxiety they cause to the physician, or the demand they sometimes make upon him for every means which he can call to his aid. I allude to cases of "summer complaint" in children, especially chronic cases, where the little sufferer is worn down by constant discharges, the digestive organs are enfeebled, and reject the most carefully prepared food, or are unable longer to digest enough to support the drain—a fatal termination following as much from debility and want of nourishment as from disease. Every practitioner meets with such cases; in our large cities, during the summer season, they are numerous enough—the trial of physicians and the affliction of patients. "In such cases the debility of the stomach is kept up by the want of due nutrition of the organ, originating in its own defective function; and it has, therefore, no power of recovering its healthy condition. Artificial digestion supplies the deficient nutriment, and the stomach, being now duly nourished, resumes its proper function." In such cases I have followed every administration of food with a dose of the wine varying from ten drops to half a teaspoonful or a teaspoonful according to the age of the patient, and I can say, without exaggeration, that I have seen more benefit result from its use than from all other remedies singly or combined. The vomiting has ceased, the diarrhœa become modified, apparently from supplying the system with nutriment.

There is another class of patients often brought under the care of the physician, for whom this wine is an excellent remedy. They are not suffering so much from disease as needing assistance in a struggle for life. Infants depending wholly or in part upon artificial food for their nourishment, frequently do not thrive, and require much care on the part of the physician, as well as the nurse, to bring them safely through the first two years of life. In such cases I have derived most valuable assistance from the use of pepsine wine as an aid to digestion. During last summer I had two babes under my care, neither of which had a drop of natural nourishment, and I fully believe neither of them would have been safely brought through the perils of a hot summer, tender age, and artificial food without the aid of this wine. To the young practitioner this may seem a matter of petty detail, but as he gains a more intimate acquaintance with the responsibilities

of his calling he will find that whatever will assist him in keeping unbroken the band of little ones in a household will be far from insignificant.

There is still another class of cases to which this remedy would seem, theoretically, well adapted, but in which I have had no opportunity of testing its powers. In the chronic diarrhœa of our army hospitals, the pathological conditions would seem so similar that I cannot doubt great benefit would result from its use. There seems to be the same demand for food rather than medicine, and the same inability of the digestive organs to prepare it for assimilation, these organs partaking of the same debility as the general system, and which is perpetuated by want of nutriment; once give power of digestion and the vicious train of morbid actions is broken and the cure almost assured.

I trust my testimony to the value of this simple medicine may be estimated sufficiently to induce a fair trial of its virtues, not only in army hospitals as above suggested, but by private practitioners. The coming hot weather will afford abundant opportunities, and if those who try it will publish the result of their observations they will render a service to some of their brethren, if not to science.

ART. V.—*Case of Fracture of Both Thighs.* By HEBERT SMITH, M. D., Assistant Surgeon U. S. Navy. (With a wood-cut.)

CHARLES D. MILLER, boatswain's mate, æt. 25, native of England, was admitted to the U. S. Naval Hospital, Pensacola, Florida, on the 19th September, 1864, with fracture of both thighs, caused by the falling of the smokestack of the U. S. Steamer Stockdale, three days before.

The fracture of the right thigh was very oblique at the junction of the upper and middle third, and complicated by a flesh wound on the outer side of the limb, not considered, at first, by the medical officer of the ship, as communicating, but which, upon further observation, was found to be in direct connection with the femur, proving that the fracture in that side was compound; on the left side the fracture was less oblique, and at the upper point of junction of the second with the middle fifth. There were numerous abrasions and contusions besides, particularly on the back, which latter embarrassed the position of the patient throughout the treatment. On admission he was found to be so comfortable upon a temporary double inclined plane, contrived on board the Stockdale, by Acting Assistant Surgeon T. M. Coan, U. S. Navy, that he was left undisturbed until some permanent apparatus could be substituted. On the 21st, two days after admission, a splint, devised by Fleet Surgeon James C. Palmer, and called by him a modification of "Smith's Anterior Splint," was applied. It

consisted of two continuous parallel rods, of No. 9 iron wire, passing over the anterior surfaces of both limbs from the toes upwards, arching over the pubes clear of the anterior spinous processes, and bent at the groins at an angle of about 30 degrees. The abdominal arch was well padded, and the whole apparatus, enveloped with roller bandages, as usual, was first secured at the pelvis, a trough of binder's boards being accurately moulded to the back of each thigh; bandages from the toes upward were next applied around each limb, including the splint, and when they reached the groins were secured to the arch on each side, and the ends finally carried over the mattress, clear of the patient's body, were made fast to the head of the iron bedstead, the weight of the body making the counter extension. Lastly, the limbs, separately slung, were suspended by a single cord passing over a pulley at the ceiling and making extension at an angle of about 30 degrees. A glance at the accompanying figure will render the whole arrangement easily intelligible.

A few hours after the application of the splint, it became necessary to loosen the bandages about the feet, and then the patient declared himself perfectly comfortable.

September 22. Passed a good night. The bandages were tightened about the thighs, and the patient sits up in bed or reclines at pleasure. The calls of nature are performed without inconvenience. The abrasions upon the back cause annoyance, but not severe pain, and he is in all respects comfortable, and raises his body by means of a rope over his bed.

October 6. Nothing worthy of remark has occurred since the last note. To-day the apparatus was found to have slackened down by stretching of the bandages, and it was readjusted throughout and secured as at first. The patient's general health is good, and he is allowed a pint of ale daily.

18*th*. The bandages were again tightened, without making any change in position, the apparatus having remained immovable since the adjustment on the 6th instant. The patient declares that the broken bones seem to him to be firmly united; he feels no motion at the points of fracture.

November 5. Fiftieth day after fracture, and forty-fifth since the application of the splint, all dressings removed; union found to be firm. Right limb three-eighths of an inch shorter than the left; united at a slight angle; salient outwards. Left thigh firmly united without any deformity. Patient placed in warm bath, and after passive motion had been employed was returned to bed with the pasteboard splints replaced upon each thigh and secured by bandages.

From this time passive motion was daily and perseveringly practised. He soon commenced using crutches with broad bases, and, but for timidity, could have walked without them. He stands erect without support, and it is only by careful measurement that any difference in the length of the limbs can be detected.

His height, as given by descriptive list when he shipped, was 5 feet 6½ inches, and after he began to walk without crutches it was found to be 5 feet 6 inches full, with the original difference of three-eighths of an inch in the right thigh.

It is proper to state, in conclusion, that since the apparatus was removed Dr. Palmer has modified it for future occasions by bending the wires outwards and downwards at the instep, and carrying them out parallel with the soles of the feet, so as to secure to their ends a copper trough, to which the patient's own shoes may be attached for support at the heels, where the chief difficulty was found in Miller's case and all others in which Prof. Smith's apparatus was applied.

[1865, Feb. 16. The patient walks with a cane, without apparent limping. J. C. P.]

ART. VI.—*Hospital Gangrene, treated by the Local Application of Buttermilk.* Reported by FRED. P. PFEIFFER, M. D., Acting Assistant Surgeon U. S. A. Communicated, with remarks, by WALTER F. ATLEE, M. D.

[THE application of buttermilk in the case here reported, was made at my suggestion after reading the remarkable paper of Dr. Jackson, "On the Uses of Sugar and Lactic Acid in the Animal Economy," contained in the April number of this *Journal*. Not being able to obtain any sour milk, as recommended by Dr. Jackson, to apply to the gangrenous wound, buttermilk was substituted. Since its employment in this case, it has been universally used as a local application, at the Satterlee Hospital, in all cases of sloughing wounds, and with the most satisfactory results. I have also used it as a dressing for stumps, immediately after amputation, and believe it to have had the effect of keeping parts free from odour that would, under other applications, have been offensive and sloughing.—W. F. A.]

Reuben Holladay, aged 19, private Co. A., 24th New York Cavalry, was admitted March 12th, 1865, into Ward P., Satterlee U. S. A. General Hospital, West Philadelphia, Pa., from Camden Street Hospital, Baltimore, Md., with a gunshot flesh wound of the left thigh. The wound was caused by a minie ball, at the battle of Hatcher's Run, Va., February 7th, 1865, which entered about four inches from the penis—below and on the inner surface—passed upwards and made its exit some three inches below the anterior superior spinous process of the ilium.

Both wounds were about one and a half inches in diameter.

The patient, when first seen, was much debilitated, pale, and eyes sunken. Bowels moved quite regularly, but a tendency to diarrhœa. He was able to walk to the water-closet for the first two days, after that he was confined to his bed.

His appetite was very poor; the tongue dry; his sleep was normal the first few nights. He seemed much tired out by his journey. Pulse quick and irritable. Prescribed: ℞.—Quin. sulph. gr. j; tr. ferri chlor., acid. sulph. aromat., āā gtt. v, M., ter die, with full diet the first three days. After that he complained of an occasional chill, nearly every day, alternating with considerable fever. Prescribed: ℞.—Pil. quin. sulph. gr. j, three times a day; and spts. æth. nitr. every hour till fever is reduced.

During this time his wound presented the following appearance: Both openings were deeply discoloured and covered with a thread-like film, and nearly black. They could not be probed. There was considerable swelling and redness surrounding the part.

The edges of the wounds had the appearance as if nitrate of silver had been applied to them, and could not be raised. There was also a disagreeable odour emitted from the wound.

The upper surface of the thigh was discoloured (dark blue and yellow); but which disappeared in a few days. Considerable pain was felt from the hip-joint to the knee. The whole was very painful to the touch. As a local application, water-dressings were much used.

The symptoms remained unchanged, and the local treatment was con-

tinued till March 26th, when hospital gangrene made its first appearance. The wound then had increased to nearly double its size; the parts around were more tumefied. The natural heat and sensibility of the limb seemed to be diminished. The discharge from the sore was horribly offensive. There was a great, and I think rather sudden, depression of the vital powers. The pulse rapid and feeble, the countenance cadaverous, and the surface of the body covered with a clammy sweat. Also had some eructations and slight cough.

Continued tonic three times a day—spts. vini gallici f℥j, every two hours; milk-punch, egg-nog, beef essence, and all the extra diet that could be obtained.

Cleaned the wound out with acid. nitric. dilut., and filled both openings with common brown sugar; syringed the wound with a solution of sugar, and covered the whole with oakum. Dressed wound four times a day.

March 27th. No change. Continue treatment.

28th. Patient visited by Dr. W. F. Atlee, Consulting Surgeon, and ordered spts. vini gallici f℥j, every hour; pil. opii gr. j, every two hours. Watch him close. Wound growing larger and more offensive. Pulse 104.

29th, 1 A. M. Complains of slight sore throat. Pulse 108; mutters and moans in his sleep, and is easily aroused out of his comatose condition; hearing rather dull, and slow to answer questions.

31st, 9 A. M. Continue treatment, but use instead of acid. nitric. dilut., solution potass. permang. (f℥ss to f℥j), five to six times a day.

The patient has vomited dark, green, watery matter, with great irritability of stomach. Give him small pieces of ice to swallow. (Much benefit was derived from a few bottles of Roussell's mineral water.) Retains no food—nothing but brandy. 1 A. M. No change; rests easier; pulse 104.

April 1. Irritability of stomach the same. No change. Continued treatment. Stop opium pills.

2d. Has a large bed-sore about two inches in diameter, over sacrum, gangrenous, of a black colour all over. Poultice: pulv. sem. lini.

3d, 10 A. M. Pulse 104. Spts. vini. gallici f℥j, every hour. Continue treatment—eggs and anything else he can eat.

Divided the part between the two openings; laid flaps aside. Sensibility of the parts lost altogether. Bed-sore discharges to-day a yellow matter, which is secreted in abundance under the edges; has increased in size.

4th, 10 A. M. Pulse 96. Sloughing of wound and bed-sore considerable. Length of wound eight inches, and width four inches. Muscles and vessels of thigh exposed, and the tissues all destroyed. Fears are apprehended of hemorrhage from the femoral artery; have, therefore, made every preparation to meet the event. Tongue clean and moist. Continue treatment. 12 M. Pulse 100. 1 P. M. Has just taken some rice pudding, but not much. Bowels rather loose; dark stool. Liquor sodæ chlor. under his bed as disinfectant.

5th, 9½ A. M. Pulse 96. No change. Continue treatment. 7 P. M. Pulse 100.

6th. The wound is still enlarging, and no change. Was recommended by Dr. W. F. Atlee to use *buttermilk*, instead of sugar and solution potass. permang. Syringed the wound with the buttermilk, and saturated some patent lint with the same, and laid it *in* the wound. Dressed the wound five to six times a day. (9 A. M. Pulse 120.)

7th, 9 A. M. Pulse 96. To our great surprise and astonishment found instead of a ghastly, offensive, sloughing wound, a *clean, sweet-smelling*

wound. The change was so great that it can be better imagined than described. Patient feels well, but rather weak. Is in excellent spirits.

8*th*, 11 A. M. Continue treatment of buttermilk and tonic; brandy every hour.

9*th*. Improving. 9 A. M. Pulse 96. Continue treatment. Has some appetite.

10*th*, 9 A. M. Pulse 96. Improving; wound doing nicely. Continue treatment.

11*th*, 9 A. M. Pulse 84. Growing better; wound around and underneath the edges healing. Continue treatment. Brandy once in three hours.

12*th*, 10 A. M. Pulse 68. Has a good appetite; is in good spirits, talkative, and is doing as well as can be expected under any circumstances.

13*th*, 9 A. M. Pulse 104. Wound healing finely; bowels loose, watery, and of a light colour; some pain in bowels. Appetite good; sleep regular. Continue treatment.

14*th*, 9 A. M. Pulse 96; bowels the same, otherwise improving. ℞.—Pulv. Doveri gr. v, three times a day. Wound looks very healthy, and under the edges it is nearly healed. Says he has a craving appetite.

15*th*, 9 A. M. Pulse 96. Still improving; bowels better. Continue treatment.

16*th*. Wound very rapidly healing. Continue treatment. Pulse 100.

18*th*. Pulse 96. Still continues to improve, and wound doing nicely. Stop pulv. Doveri.

20*th*. Pulse 92. Tongue clean. Continue treatment.

22*d*. Pulse 108. Bowels costive; otherwise no change. Continue treatment.

24*th*. Pulse reduced to its average of 96. Bowels regular.

27*th*. Patient does not complain of anything; has a very good appetite; sleeps well.

30*th*. Pulse 96. Continue treatment.

May 1. Patient is doing exceedingly well. Brandy f℥j, every four hours. Continue treatment.

3*d*. Improvement can be noticed every day in patient. Continue treatment.

5*th*. The wound is rapidly closing in the centre, and has healed out entirely under the edges.

7*th*. Since my last report the wound has healed in the centre and closing very rapidly. No pain of any kind, and moves his limbs around with much freedom. Has asked permission to sit up to-day, as he says he feels quite strong, which was granted for a short time. Continue treatment.

10*th*. Patient sits up every day. The case progresses with remarkable rapidity. Pulse 84.

13*th*. General health good; bed-sore very nearly closed.

ART. VII.—*Treatment of Gonorrhœa in the Female.* By JOHN J. BLACK, M. D., one of the Resident Physicians to the Philadelphia Hospital, Blockley.

THE following is a *résumé* of the treatment and its results as practised in one hundred and seven cases of gonorrhœa in the female during the

past winter. In many patients the mucous membrane of the upper part of the vagina was involved, as well as its reflections over the neck of the uterus. In no instance was there any great constitutional disturbance from implication of the pelvic viscera, although in some cases where the patients had neglected to place themselves under proper treatment at an early day, the cavity of the neck of the uterus appeared to be affected with subacute inflammation, doubtless a result of the prior trouble. All cases were examined by the speculum at the first visit, the size of which was regulated by the amount of inflammation present. Although many authorities reprobate the use of this instrument in the inflammatory state, our experience with it here is most satisfactory, as we are thus enabled to make a thorough examination and obtain a full view of the parts implicated. Using, as we do in these cases, the smallest size glass instrument, well oiled, and introduced with gentleness, it gives the patient very little inconvenience.

In regard to the management of gonorrhœa, we acknowledge but one rational plan of treatment; we regard it as an inflammation, and treat it as such, whether in man or in woman. If the inflammation be very acute, we give antimonial mixtures, with some soporific if required; decrease the diet, and make applications of lead-water and laudanum, or a large flaxseed poultice over the external genitals. At the same time we generally order injections of water, of a temperature best suited to the feelings of the patient, medicated with a little extract of opium, to be used every three or four hours. This plan of conforming the temperature of all applications to inflamed surfaces to the sensations of the patient we have found to be of the greatest importance, especially in these cases, and productive of the greatest benefit. Under this treatment, generally in from twenty-four to forty-eight hours, the tumefaction and redness subside, and the patients express themselves as much relieved. In twenty-four hours more, the local inflammation subsiding, we commence with astringents and other such remedies. Now come the important questions: In what form shall we apply these remedies? Of what strength shall we use them? And what advantage does any one possess over another? First, as to the form. After a short trial of injections, we abandoned them in this stage of the disease. Their application was more or less annoying to the patients, and if trusted to themselves they were imperfectly applied or neglected altogether. The application of ointments spread upon cloth we found more efficacious than injections. The citrine or red oxide, or comp. iodine ointments, diluted from four to seven times with lard, were found to be among the best. Far preferable to either of the former methods is packing the vagina with strips of patent lint or soft cotton cloth, five inches long by two inches wide, soaked in a solution of the required salt. We found those cases to do best where the vagina was packed moderately full, care being taken not to interfere with the urethra. This packing was allowed to remain twenty-four hours, and the patients appeared to suffer little or no inconvenience. The great advan-

tage gained by this method is the keeping the walls of the vagina entirely separated. Of course this dressing must always be applied by the medical attendant, and always with the speculum. One great objection to it, as well as to injections, is that they both more or less soil the clothes from the contact of the remedies used; unfortunately the best remedies leaving the most indelible stains. In view of the objections to these remedies, after a little thought, we were led to use vaginal suppositories, made of some mild substance as a vehicle.

The result has more than equalled our anticipations. The vehicle being bland and soothing, the patient experiences no unpleasant sensation from the presence of the suppositories. The ease of their application is one of their greatest recommendations, the patient being able and willing to apply them herself; whereas they cannot or will not apply the cloth packing so as to be productive of any real benefit. By their use the frequent introduction of the speculum is avoided, which is a great relief to the patient. We have found them to be equally available for the application of remedies to the vagina and os uteri in non-specific discharges.

We herewith present several formulæ, which we have used very extensively and with great satisfaction.

℞.—Ol. theobromæ, ʒxij; morphiæ sulphatis, gr. vj; liq. ferri persulph., gtt. cxliv; cerat. adipis, ʒiijss. M. et fiant suppositoria xij.

℞.—Aluminis pulv., ʒiij; acid. tannici, ʒij; ext. opii, gr. xij; ol. theobromæ, ʒxij; cerat. adipis, ℈x. M. et fiant suppositoria xij.

℞.—Ol. theobromæ, ʒxij; ungt. iodinii comp., ʒvj; morphiæ acetatis, gr. vj. M. et fiant suppositoria xij.

℞.—Ol. theobromæ, ʒxij; morphiæ acetatis, gr. vj; unguent. hydrarg. nitratis, ʒv. M. et fiant suppositoria xij.

℞.—Ol. theobromæ, ʒx; morphiæ acetatis, gr. vj; ol. copaibæ, gtt. cxliv; cerat. adipis, ʒviij; acaciæ pulv. q. s. M. et fiant suppositoria xij.

The favourable action of the local application of copaiba is contrary to what has generally hitherto been reported concerning it.

℞.—Ol. theobromæ, ʒxij; morphiæ acetatis, gr. vj; liq. zinci chlor., gtt. cxx; cerat. adipis, ℈x. M. et fiant suppositoria xij.

We also tried the oil of turpentine by this method, but it appeared to exert no influence over the disease. Bromine was also tried, but its volatile nature prevented its use in this manner. We selected a number of cases as nearly alike as possible for this suppository treatment; all the cases being recent. The average number of days required for the cure was as follows: Liq. ferri persulph., nine days; alum, tannic acid, etc., nine and one-half days; ol. copaibæ, twelve days; comp. iodine ointment, thirteen days; citrine ointment, fourteen days; chloride of zinc, nineteen days.

The suppositories were not applied during the menstrual period, but that time was deducted in the average. I think they might be used during the

menstrual period, and thus possess an additional advantage in not causing a suspension of treatment during that time.

These cases were all thoroughly cured, having been examined ten days after treatment ceased, and found to be well.

We generally ordered one suppository to be inserted every other day, having found by repeated examination that the action of each continued at least that length of time, especially those of the iron, and those of the tannic acid and alum.

Then, to sum up: We claim for the treatment of gonorrhœa in the female by vaginal suppositories the following advantages:—

1. Efficiency equal to, if not greater than, other remedies. 2. Cleanliness. 3. Portability. 4. Ease of application. 5. Soothing properties, while rags and the like irritate. 6. Frequent application of speculum avoided. 7. Their presence not disagreeable. 8. They can be used at all times.

In regard to the strength of the remedies used, our experience with the suppository treatment has demonstrated that the combinations and proportions used in the accompanying formulæ are entirely satisfactory.

As to solutions for packing the vagina, we used them chiefly of three different strengths: gr. iij ad ℥j; gr. v ad ℥j; and gr. x ad ℥j; and altogether obtained much the best results from the three and five grain solutions. Even if the case was old and the parts almost destitute of sensibility, we still found, in the great majority of these cases, that the strong solutions were inferior to the weaker. Now and then we found one of those chronic cases, which we could overwhelm with a strong dose, but generally they proved irritating and rendered the patients uncomfortable for a time, whereas the milder proportions in like cases steadily and rapidly effected a cure. If we wished an immediate and positive impression, we now and then pencilled the walls of the vagina and cervix uteri lightly with solid nitrate of silver, and then kept the walls apart by inserting a strip of cotton cloth. We do not think that even this procedure had any advantages over milder and less unpleasant applications. In gonorrhœa within the cervix uteri we always used the solid stick of nitrate of silver, and with good results, as the membrane here seemed far less sensitive than that outside. Where the gonorrhœa extended into the urethra, which was rare, we generally injected a three or five grain solution of persulphate of iron or nitrate of silver with most satisfactory results. Now in regard to the remedies used, they were numerous, and each submitted to a fair and impartial trial:—

Persulphate of iron; nitrate of silver; permanganate of potassa; sulphate of copper; sulphate of zinc; acetate of zinc; tincture of iodine; and chloride of zinc.

We were pleased with the results from the persulphate of iron above all others, acting, as it did, as a powerful astringent and stimulant. From three to five grains to the ounce of water is the best proportion in which to use this salt. Next we preferred the nitrate of silver in the same propor-

tions. Next to the nitrate of silver we obtained the best results from the sulphate of copper, seldom using it over five grains to the ounce of water. Next comes the sulphate of zinc. Next the acetate and chloride of zinc, in about the same proportions, using for the latter the liq. zinci chlor., from three to six drops to the ounce of distilled water. From the tincture of iodine we did not receive very favourable results. Diluted one-half, as recommended by some, it proved very irritating, and produced excoriation of the parts. Still more diluted, its action was far inferior to any of the above mentioned remedies.

From the foregoing observations, then, we conclude, that in treating gonorrhœa in the female (and our experience is the same in non-specific inflammations of the vaginal mucous membrane), the milder remedies are superior to the stronger, whether the trouble be of longer or shorter duration. The comfort of the patient is more surely maintained; the disease more rapidly advances toward a cure, and the parts are sooner returned to their normal sensibility.

As not altogether foreign to the subject we wish to make known here the very favourable results obtained by us from the application of bromine as a caustic to chancre. It was applied thoroughly by means of a pine stick or glass rod to the sores, and then covered with an oiled rag for a few hours, and afterward treated, generally, by what we prefer in these cases, the common black wash with extract of opium added. In a short time the slough comes away, and leaves a beautiful healthy granulating surface. It does its work thoroughly and efficiently, whether the chancre be hard or soft, and in the phagedenic chancre we found nothing whatever to approach it in effectiveness. One application was generally sufficient, and its virtue seems to rest in its great destructive power, which causes it to clear away at once the unhealthy tissue, which act it takes several applications of most of the popular remedies to perform.

ART. VIII.—*On the Antagonism of Atropia and Morphia, Founded upon Observations and Experiments made at the U. S. A. Hospital for Injuries and Diseases of the Nervous System.* By S. WEIR MITCHELL, M. D., Wm. W. KEEN, M. D., and GEORGE R. MOREHOUSE, M. D.

DURING our connection with the U. S. A. Hospital for Injuries and Diseases of the Nervous System, we have been obliged to resort to every possible expedient for soothing the pain of those terrible cases of neuralgia, which in some shape are apt to follow as a consequence of neural injuries. Among these means incessant use has been made of hypodermic injections,

which alone in many instances seemed able to overcome the anguish of certain forms of neuralgic distress. To what extent we have employed this mode of relief may be gathered from the fact that, at certain periods of our service, the resident surgeons made every day from twenty to thirty subcutaneous injections. In one case half a grain to a grain of morphia was injected thrice a day, and the man finally recovered after having used nearly four hundred injections.

We were naturally led to examine with care into the pretensions of the several agents which have credit for their power to lessen or destroy the sense of pain. The results of this inquiry were of the more value, because they were confined to the use of these agents by injection only, and because they were studied by more than a single observer. Our investigation brought us finally to consider the therapeutic relations of atropia and morphia, to which subject the greater bulk of this paper will be devoted.

The information which our note-books give in regard to the comparative value of remedies used to allay pain, is the result of an almost unexampled experience, and we shall not hesitate briefly to relate it before passing on to our main topic.

After repeated trials of conia, atropia, and daturia, with the intention of relieving pain by their subdermal use, we ceased to resort to them. On the other hand the employment of morphia, or of some preparation of opium for subcutaneous use, became a part of the every-day routine of practice.

Like others, we have met with certain inconveniences attendant upon this mode of employing morphia. In rare cases it always caused distressing sick stomach, but as the pain for which we used it was ofttimes agonizing, the patient usually preferred to endure the sick stomach rather than fail of the delightful relief he obtained from the injection. In these instances it was commonly observed that the morphia ceased after a time to produce either nausea or emesis.

The local annoyances resulting from injections so long continued and so numerous, were sometimes very embarrassing, for though in some men they could be used in the same limb week after week, in others the numerous punctures produced a very unpleasant increase of sensitiveness in the part. Such an instance may be found on page 151, Case 31, of our treatise on wounds and other injuries of nerves. In other persons the injections gave rise to occasional abscesses, and in a soldier who was at one and the same time the subject of a very painful wound of the arm, and of a cold abscess on the back, every injection gave rise to a large indolent abscess. One instance of erysipelas following the use of an injection was seen by us. (*Op. cit.*, p. 150.)

As the opinion of many good observers is quite decided as to the fact that the injection gives the same relief, whether made near to or remote from the seat of pain, we may with reason be asked, why we used so many injections in the same limb or neighbourhood. The answer lies in the fact

that our patients very early, and we ourselves later and more reluctantly, reached the conclusion that the point at which the injection was to be employed was not a matter of indifference. In the milder instances of neuralgia a subdermal injection of morphia used anywhere in the body did give relief, but in cases of "burning neuralgia," such as we have described in our book on nerve wounds, p. 100, *et seq.*, the nearer we could bring the agent to the place where the pain was felt, the greater was the ease obtained. We are the more anxious to insist upon this matter, because we neglected to make the same comment when detailing our mode of treating these lesions in the volume above mentioned. The belief thus reached is certainly not altogether unphysiological, as we very well know that morphia is capable of causing a local paralysis of sensory nerves, with which it may come in contact.

While conducting the inquiry, some of whose conclusions we have just stated, it occurred to us that possibly the antagonistic influences of morphia and atropia might be so utilized as to enable us usefully to employ them together or in succession. With such a purpose subdermal injections of the two medicines were used, sometimes together, at other times one after the other. The result of these observations proved at once so interesting and so puzzling, that we finally entered upon a deliberate course of experiments with the intention of ascertaining in what respect and to what degree, and through what periods of time, the two drugs in question were antagonistic. While the final conclusions thus reached by us have served in a measure to strengthen the belief in the mutual power of these agents to counteract one another in the economy, they have also brought to light a range of very curious facts, which we think are novel, and which could certainly not have been learned from any course of experiments upon animals lower than man.

And here it is not unfit that we should criticize the loose way in which therapeutic inferences have been drawn from experiments upon animals, where of necessity poisonous doses have been employed, and their effects studied. Most of the symptoms which ensue when a course of any ordinary narcotic has been taken are so completely subjective that we can learn their existence only by the statements of the person who feels them. Even when these drugs are given in poisonous doses to animals, it does not follow that the resultant symptoms will, either in degree or in kind, correspond accurately to those which occur under like circumstances in man. Dr. Anstie, in his recent work on narcotics and stimulants, has very well illustrated this proposition. We ourselves have seen a dog recover after the subcuticular injection of *twenty-five grains* of atropia thrown in divided doses into various parts within a few minutes.

The temptation to study poisons in cold-blooded creatures is always very great, because in these animals certain facilities for toxicological study are

presented which do not elsewhere exist; but, as might be expected, analogies fail us more and more as we pursue our researches upon creatures remote from man. No more striking example of this is to be met with than one of us, Dr. Mitchell, has recorded in the *Journal de la Physiologie* for January, 1862, where the author details at length a series of experiments upon snapping-turtles, whom he attempted to poison with woorara.

In this paper it is shown that while only $\frac{1}{96}$ of a grain is required per pound of the animal to destroy a rabbit within a few minutes, the snapping-turtle is poisoned with difficulty, and not surely by $\frac{1}{7}$ of a grain for each pound of its weight.

It would be easy to extend these examples, and to show, not that we should cease to use animals for the study of poisons, but that in order to appreciate properly any toxic agent, we must follow its effects through a wide range of created existence from vegetable to man, and that its therapeutic uses are to be learned only from its influence upon the being to whom finally it is to be of medicinal value.

The experiments which we shall now relate were most of them made upon soldiers who were suffering from painful neuralgic diseases, or from some cause entailing pain. In some cases, however, convalescent men were the subjects of our observations, but in no instance were they allowed to know what agents we used, or what effects were expected.

All of the drugs employed were injected under the skin, so that we desire to have it most distinctly understood, that we do not extend our inferences and results to the administration of these same drugs by the mouth. Thus given, their rates of absorption may vary so as to produce no inconsiderable modification of their relations to one another, although, as we very well know, their general antagonism would remain the same.

Antagonism of Atropia and Morphia.—The mass of evidence in favour of this belief is now considerable, and has increased since Dr. Wm. F. Norris summed it up in a very excellent paper in the number of this journal for October, 1862. And while the positive evidence in this direction has gained largely, it has been shown repeatedly that the negative evidence derived from experiments on animals is not to be trusted, although to it Dr. Brown-Séquard (*Journ. de la Phys.*, Oct. 1860, p. 726) has given the sanction of his great authority.

Assuming therefore that there is such a peculiarity of power in these two alkaloids as to enable them in man to neutralize one another physiologically, as acid and alkali may do chemically, certain questions arise with which we here propose to deal.

If it were clear that these two agents acted in some simple direct way upon an economy equally as simple, the problem before us would indeed be like the case of acid and alkali, and present to us little that was confusing or difficult to comprehend. If, on the other hand, each of these drugs acted with equality of force, but in opposite ways upon numerous organs of a

complex being, the question would even then be simplified. But it seems to us that although both atropia and morphia have a wide range of influence in the body, that they do not act opponently throughout the whole sphere of their activity, while in some part of it at least, there is even a certain amount of correspondence between them, or at least the appearance of this.

We shall consider first the effect of morphia and atropia upon the circulation and respiration, and shall then observe whether a different result occurred when the two were given together in doses such as experience taught us were therapeutically equivalent.

Do these two agents act differently on the circulation, and if so, do their effects neutralize one the other? This question was answered by a series of observations in which certain doses of either morphia or atropia were injected subcutaneously and the result studied.

Effects of Morphia on Circulation and Respiration.—The subjects of our experiments were men free from fever. Some were suffering from neuralgia, and some were men in very fair health, suspected of malingering. The doses used were, one-third or one-fourth of a grain of sulphate of morphia in solution. The patient was kept recumbent for some time before and during the observation.

The above amounts produced no striking effects on the circulation. In two out of eighteen cases the pulse rose from 6 to 10 beats within a half hour. In 6 it did not alter materially during several hours, and in 10 it fell an average of 8 beats only. The respiration was as little affected. It appears then that in persons free from fever subdermal doses of $\frac{1}{3}$ to $\frac{1}{4}$ gr. of sulph. morphia do not conspicuously influence the heart or lungs. It is proper to add that the pulse became fuller under the morphia, and that this was at its maximum when the general influence was greatest.

Effects of Atropia on the Circulation and Respiration.—In about one-third of our cases the pulse fell within four to ten minutes after the injection of one-fifteenth to one-thirtieth of a grain. The fall did not exceed eight beats in any case. In the remaining cases the pulse was unaffected for a few minutes, but in one and all there was a rapid rise after the seventh or eighth minute—a rise which at its maximum was rarely less than fifteen beats, and in most instances forty beats per minute. The pulse reached its highest number within an hour in the great mass of our cases.

The fall was more gradual. At or about the fourth hour the pulse was commonly beating nearly the same number as it did when the observation began. It continued to fall, however, and the minimum was reached at the tenth or eleventh hour. From this period it rose again to its normal starting-point, which it attained within the twenty-fourth hour.

Shortly after we began to make these observations, Dr. J. C. Da Costa, in charge of the wards for diseases of the heart, in Turner's Lane Hospital, studied the influence of atropia upon the heart in a large number of cases of soldiers affected with functional disturbances of that organ. He

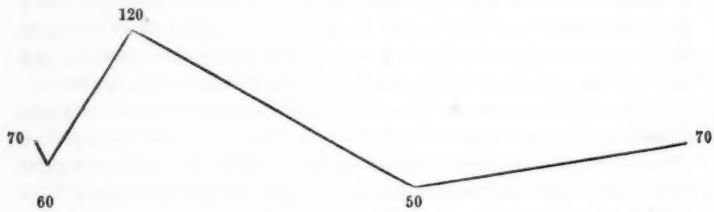
obtained results which do not differ essentially from ours, except that the primary fall of the pulse was more constantly noted. We are under the impression that we should also have met with it more frequently if our first examination of the pulse had always been made within the first five minutes after the injection of the medicine.

The following records may answer as examples of the general character of the changes in the pulse-rate after a single full subcutaneous dose of atropia.

INJECTED UNDER THE SKIN OF THE ARM

One-thirtieth grain of sulph. atropia.			One-fifteenth grain of sulph. atropia.		
Pulse		80			
7th	minute	76	Pulse		62
17th	do.	106	10th	minute	56
30th	do.	108	27th	do.	108
48th	do.	106	80th	do.	94
90th	do.	88	3d	hour	64
3d	hour	78	4th	do.	62
5th	do.	60	6th	do.	66
7th	do.	56	8th	do.	64
10th	do.	52	10th	do.	50
14th	do.	60	24th	do.	70
24th	do.	78			

Taking the above cases as illustrations, the pulse curve under atropia might be thus represented.



The force of the pulse, as well as its fulness, was notably diminished throughout the rise in its number.

We, as well as Dr. Da Costa, were much struck with the fact that the rate of respiration did not increase as the pulse rose. Indeed, in many instances the number of respirations fell or remained unaltered, while the heart beats ascended from 70 to 120 per minute.

In the next series of experiments we endeavoured to learn whether, when full doses of morphia and atropia were injected together, the pulse would be modified so as to alter the curves which we have drawn as expressing its changes under the use of the latter agent.

These observations were checked by two other sets of experiments. In one we gave a full dose of morphia subcutaneously, and when the pupils

were well contracted, or the cerebral influence clearly marked, the atropia was employed. In the other we gave the atropia first, and when it began to show an effect on the pulse we injected a full dose of morphia.

In each and all of these methods we obtained like results, the pulse obeying the same law as when atropia alone was injected; in other words, behaving as though no morphia had been employed.

It thus appears that the influence of atropia on the pulse and respiration is in no way altered by the use of full doses of morphia, so that in this particular their supposed antagonism does not exist.

Effect on the Eye.—It is needless to show anew that atropia dilates and morphia contracts the pupillary aperture. Our observations consisted in using injections of both drugs in succession or together so as to note how they influenced the iris. Their antagonism was here very plain. When, in the case of a man whose pupils were dilated by atropia, we gave morphia, the pupil began to lessen within half an hour, and either became normal or else contracted. It was noticeable that the accommodation often remained paralyzed for an hour or more after the pupils had been relieved from the effects of the atropia.

These observations taught us also that when neutralizing doses of the two drugs were made use of the influence of the morphia was sure to pass away first, so that the pupils would become dilated again within five to ten hours, or unless a second dose of the morphia were given.

It was of course found difficult to regulate the doses so that they should always neutralize one another precisely, even for a brief period, and hence it was common to see, as above stated, a condition of complete antagonism prevailing for a time only, when one or other medicine would dominate the system. As a general rule, about one-quarter of a grain of morphia will neutralize for a time one-thirtieth of a grain of atropia, but the latter acts far longer than the former.

We may infer that these two agents counteract one another as regards their power to alter the size of the pupil and affect the ciliary muscle.

The *effects of the two drugs upon the cerebral functions* were studied separately, with care, and then in a second series of observations they were used together or in succession.

When in any particular case we found that some one of the well-known specific effects of either drug was always and markedly shown, we tested the antagonism as to this symptom by giving the other agent.

Here, as elsewhere, the judgment is apt to be led astray by one of the drugs overlapping, so to speak, the period of the other one's activity. We feel confident, however, that the following symptoms, caused by atropia, for instance, are lessened or lost when the system is under the action of opium.

The headache and phantasms of atropia are certainly thus controlled, as well as the partial deafness and visual defects, which, in high doses, it occasions. On the other hand, when morphia has been fully used, the

drowsiness and stupor, which are the best tests of its power, disappear before the influence of atropia.

In like manner the opium pallor and the flush from atropia may be modified or dispelled. Perhaps the most peculiar cerebral symptom of atropia is its tendency to cause phantasms and illusions. We found that under doses of $\frac{1}{25}$ of a grain these were common, and in some men could always be thus brought on. Usually they were absent so long as the eyes remained open, but arose at once upon closing them. This condition was singularly subdued by morphia.

Drowsiness caused by morphia was as surely lessened or destroyed by the counter-agency of atropia; and, in fact, atropia, given alone in full dose, is very apt to cause a restless night to follow, so that it is assuredly in no sense a true hypnotic.

Both morphia and atropia check the secretions from the mucous surfaces, so that in this respect they can scarcely be deemed antagonists, although the influence of atropia in drying the mouth is much the more striking of the two, while it has no tendency to constipate the bowels, and even in some cases produced loose stools.

Nausea.—Morphia was very apt to cause nausea when injected subcutaneously. In some men it never failed thus to affect them. When to such persons we gave the two drugs in equivalent doses—that is to say, doses which controlled the pupil, and perhaps after a time dilated it—we still found that nausea occurred as when only morphia had been employed. Here again the antagonism fails.

Effect upon the Bladder.—As regards the bladder, we obtained results which very much surprised us. It is well known that morphia causes dysuria in some persons. This is apparently due to a partial and temporary loss of power to contract that viscus. That such is the cause is shown by the sluggish motion of the stream of urine which flows, when, by a great effort, the patient has succeeded in beginning to micturate.

We found, to our surprise, that in many men injections of $\frac{1}{15}$ to $\frac{1}{30}$ grain of atropia sulphat., used subdermally, gave rise to a state of things so exactly similar, that one might have supposed it the effect of morphia. Consequently, when we selected such cases to test the antagonism of the two drugs in this particular, we were prepared to find that the dysuria was in nowise modified. Indeed, in some of these instances the symptom was so conspicuous as to give rise to the suspicion that the exhibition of the two agents together had occasioned a greater difficulty of urinating than arose from either of them when used alone.

It thus appears that, as regards the bladder, atropia and morphia do not antagonize one another, and that there is some reason to suppose that they act alike on this organ.

Pain.—The most important use of morphia in medicine is to lessen pain. Its power to do this we are naturally disposed to associate with its sleep-

compelling virtues; yet, in reality, the two powers are distinct enough, although both are possessed by this potent drug. How much apart they really are may be learned by the fact which we have discovered, namely, that while atropia destroys the narcotic effect of morphia, it leaves nearly undisturbed its power to lessen or overcome pain.

This interesting conclusion was thus reached: Several cases of intense neuralgic suffering were selected. In each of them we ascertained, by repeated trials, what dose of morphia would restore the patient to entire ease. Next the same patients were treated with full injections of sulph. atropia, $\frac{1}{15}$ to $\frac{1}{48}$ grain, in order to see whether or not it would control the pain. How utterly wanting in this power it seemed to be, we have already stated.

The third series of observations consisted in injecting the two drugs together or in succession. Somewhat to our surprise, the morphia still appeared to possess its full and perfect power to destroy the sensation of pain.

These experiments were so varied and so numerous as to leave us no room to doubt the correctness of our final belief, that, as regards its anæsthetic property, morphia is not counteracted by atropia.

It would have been easy with larger leisure than ours to have further inquired as to the effect of the two drugs upon the urine, and as to the possibility of their antagonizing one another in that direction. Enough has been done by us, we trust, to show that the question as to the physiological antagonism of atropia and morphia has not as yet been fairly answered.

If we be correct in the views expressed in the foregoing pages, certain practical lessons of some value may be learned from them.

If atropia lessens or destroys the unpleasant influence of morphia on the cerebrum, but does not alter its power to allay pain, there seems to be no reason why we should not use them together so as to obtain all that is best from the morphia with the least amount of after discomfort.

We have certainly had good results from such a use of both drugs, in the form of suppositories, in cases of disease of the bladder or generative organs.

Again, it is sometimes desirable to use either drug in very full doses. This we may do quite fearlessly when assured of our ability to restrain its action by a full exhibition of its opponent.

The foregoing experiments and observations authorize us, we think, to draw the following conclusions as to the use of hypodermic injections, and as to the antagonism of atropia and morphia:—

1. Conia, atropia, and daturia have no power to lessen pain when used subdermally.

2. Morphia thus used is of the utmost value to relieve pain, and is most potent, in certain forms of neuralgia, the nearer it is applied to the seat of the suffering.

3. Morphia lowers the pulse slightly or not at all, atropia usually lowers the pulse a few beats within ten minutes, and then raises it twenty to fifty beats within an hour. The pulse finally falls about the tenth hour below the normal number, and regains its healthy rate within twenty-four hours.

4. Morphia has no power to prevent atropia from thus influencing the pulse, so that, as regards the circulation, they do not counteract one another.

5. During the change of the pulse under atropia, the number of respirations is hardly altered at all.

6. As regards the eye, the two agents in question are mutually antagonistic, but atropia continues to act for a much longer time than morphia.

7. The cerebral symptoms caused by either drug are, to a great extent, capable of being overcome by the other, but owing to the different rates at which they move to affect the system, it is not easy to obtain a perfect balance of effects, and this is made the more difficult from the fact already mentioned, that atropia has the greater duration of toxic activity.

8. The dry mouth of atropia is not made less by the coincident or precedent use of morphia. Atropia does not constipate, and may even relax the bowels; morphia has a reverse tendency.

9. The nausea of morphia is not antagonized or prevented by atropia.

10. Both agents cause dysuria in certain cases, nor is the dysuria occasioned by the one agent relieved by the other.

11. Atropia has no ability to alter or lessen the energy with which morphia acts to diminish sensibility or relieve the pain of neuralgic disease.

12. As regards toxic effects upon the cerebral organs, the two agents are mutually antidotal, but this antagonism does not prevail throughout the whole range of their influence, so that, in some respects, they do not counteract one another, while as concerns one organ, the bladder, both seem to affect it in a similar way.

ART. IX.—*Two Cases of Ovariotomy.* By E. R. PEASLEE, M. D., LL. D.

OVARIOTOMY is no longer, by any means, an uncommon operation; and the following cases are reported mainly from their bearing upon certain questions of great practical moment respecting the manner of performing the operation itself.

CASE I. Mrs. C. A., aged 42 years, married, and a mother eighteen years since, first noticed an enlargement of the right side of the abdomen in August, 1863. This gradually increased till I first saw her, in consultation with Dr. Hubbard, of this city, in October, 1864. At this time her circumference was fifty inches, the lower extremities were very œdematous, the pulse 115, the appetite almost gone, and the strength much prostrated.

I diagnosticated a polycystic ovarian tumour, and advised tapping; both because the tumour was interfering with respiration and digestion, and because I found the patient was then too much prostrated to allow of ovariotomy.

On the 3d of October I tapped her, assisted by Dr. Hubbard, and removed twenty-three pounds of fluid from the principal sac. The œdema of the lower extremities, however, did not disappear, as usual, after the tapping, though the patient's strength and appetite increased somewhat. But the sac rapidly refilled; and though the case afforded much below the average probability of success, I did not feel at liberty to oppose the patient's wish, after informing her of all the risks, that I would give her the only remaining chance of life; and I removed the tumour on the 8th of December, 1864. Present, Drs. Hubbard, J. Foster, Thomas, Conant, and Field, of this city.

I should state here that the weather was very unfavourable for some days before and a week after the operation (incessant rains and fogs); but I did not deem a delay justifiable, on account of her rapidly failing strength.

Operation.—The incision extended from one inch above the symphysis pubis to four inches above the umbilicus, eleven inches in all; as it was found that a shorter incision would not admit of the removal of the tumour after all the larger sacs were evacuated. Some very firm adhesions were found to the left of the umbilicus, and others of slight extent and firmness on its right and in the right iliac fossa. They were all broken down by the introduction of the hand; having been previously detected by passing around the tumour, and between it and the abdominal walls, a polished steel urethral bougie, previously dipped in the artificial serum I am accustomed to use.

A double ligature (three threads of saddlers' silk, waxed, but not twisted) was passed through the pedicle, each half then tied around one-half of the latter, and both cut off close to it, when the tumour was removed. The incision was then closed by seven harelip needles, one inch apart, below the umbilicus, and six silver sutures between them. Above the umbilicus there were six more silver sutures. Thus the incision was closed throughout, the stump of the pedicle remaining *in situ* in the peritoneal cavity. All the needles and sutures included the peritoneum as well as the rest of the abdominal parietes. A compress wet in warm water and covered with oil silk, and a flannel bandage, were applied to the abdomen, and the patient removed to her bed.

The patient died on the seventeenth day after the operation, and the following is a brief *rêsumé* of her progress in the mean time:—

Was restless and prostrated till 1 A. M., when reaction was fully established, and pulse 118. The excitability somewhat abated at midnight, when gtt. xxx McMunn's elix. opii were given per rectum. Slept about three hours. The enema or an opium pill per rectum was required two or

three times daily during life, and thus regular sleep was usually secured each night. The catheter was used every six hours for six days, the urine being always free and normal. The compress was changed twice every twenty-four hours, and milk-porridge given as nourishment the first five days.

First day after operation. No pain; pulse 116 to 120; skin natural; is very comfortable, and slept well the following night.

Second day. Pulse 116 to 120, and stronger; a little more heat and dryness of the skin; no pain.

Third day. Pulse 112 to 120; has suffered for several hours from colic pains, and there is some tympanites. Introduced rectal tube, and removed the gas; used pil. opii per rectum, to relieve the pain, and had to repeat it twice in twenty-four hours for several days for this purpose.

Fourth day. Pulse 112; had a slight alvine discharge; more tympanites and collection of gas, which was removed as yesterday. Gave brandy ʒj every two hours. Not much sleep till from four to eight o'clock next morning.

Fifth day. Pulse 102 to 104; quite tympanitic, but gas passed freely through tube. Whine-whey given, since beef-tea and milk-porridge acidify. A good night ensued.

Sixth day. Pulse 102 to 110; much as yesterday; a small alvine discharge this afternoon; exhausted by the pain, and did not sleep much to-night.

Seventh day. Pulse 100 to 112; feels exhausted. An enema of infus. menth. viridis Oij, to remove the gas, succeeded well; when patient slept well, and pulse fell to 98. Bladder more irritable yesterday and to-day, and catheter used every two or three hours. An enema of beef-tea ℥ij and port wine ʒss every four hours.

Eighth day. Pulse 100, and quite strong; less tympanites; countenance better than hitherto. No opiate during this day.

Ninth day. Better every way; pulse 98, and good. Repeated enema of menth. vir. with success. Two alvine discharges to-day, from a laxative given last evening; most comfortable day yet. Port wine ʒss and beef-tea every two hours. A good night followed.

Tenth day. Less tympanites; pulse 96 and good; incision had united by first intention throughout, but it is now opened at lower part for half an inch, and ʒss fetid pus escaped below the lower pin; it appeared to be caused by a ligature around one of the needles. Brandy substituted for the port wine, and tinct. cinchonæ comp. to be given (ʒj) every three hours. Tympanites not increased; no tenderness of abdomen yet, except as due to the distension; not much sleep to-night.

Eleventh day. Pulse 94, and strong; tympanites much reduced; tongue better (has never been much affected), and she for the first time speaks of having some appetite, and relishes toast and tea; discharge fetid, and about

℥ij; erysipelatous redness at lower border of the incision. Pulse 100 and weaker during the evening; more tympanites.

Twelfth day. Pulse 94; tongue somewhat red; erysipelas extends over lower six inches of the incision. Removed all the needles in this part, and applied adhesive straps instead. Discharge fetid (℥ij); not much tympanites. Incision looks better this evening; erysipelas not extending; less tympanites. Has taken brandy and beef-tea every two hours.

Thirteenth day. Pulse 96 to 104, and weaker; no appetite; feels depressed, though she slept well last night; tongue better, but still red; erysipelas disappearing, and the discharge is less, but the incision is now laid open *down to* the peritoneum all the way below the umbilicus. To take quiniæ sulph. gr. j every three hours.

Fourteenth day. Pulse 100 to 102, and soft; looks better, and had a good night; tongue redder, and dry in middle; abdomen better in all respects; very little discharge from incision.

Fifteenth day. Pulse 102, and weaker; at 11 o'clock last night vomited a green and intensely acid fluid; also twice afterwards. 1½ P. M. Pulse 112, and weaker; has just got over a *chill* which lasted an hour. 11 P. M. Pulse 120; feels a little dizzy; discharge more fetid again, and edges of incision redder.

Sixteenth day. Pulse 120, and weak; had but little sleep last night, and is very dizzy; a fetid pus discharges (℥ss) from lower end of incision and behind symphysis pubis. I inject water and liq. sodæ chlorinat. (Oj to ℥iij) into the cavity, and syringe it out thoroughly. 9 P. M. She is much exhausted, and I increase the amount of stimulants.

Seventeenth day. Pulse 122, and weaker; tongue slightly dry and red; can take no food by the mouth; incision beginning to heal throughout; discharge less fetid; no dizziness. She has emaciated rapidly during the last four days, and has had slight tenderness of abdomen during the last forty-eight hours, since the chill before mentioned, and which has not recurred. She is failing, but the brain is unaffected. At 9 P. M. she became dizzy, at 9½ the hearing was lost, and at 10 she died, without a struggle, from mere exhaustion.

Post-mortem eighteen hours after death.—Abdomen very tympanitic. Incision open *down to* the peritoneum throughout its length, except some bands, one-eighth to one-half an inch wide, extending across the spaces between the needles below the umbilicus, and two others above the latter, one inch and half an inch long respectively. The opening at the lower end of incision did not penetrate the peritoneum, but entered an abscess extending behind the left ramus of the pubes.

There was very slight peritonitis, and some exudation into the peritoneal cavity. At the site of the principal adhesion of the tumour was a thick adhesion of the recently exuded plasma.

The pedicle of the tumour was atrophied, but *no slough* had occurred.

The ligature around the largest portion of the stump had nearly slipped off; the other was still *in situ*, and covered by an exudation already somewhat organized. The peritoneum was united everywhere behind the incision, so that the discharge could not enter its cavity when the incision itself reopened. Both kidneys were very much congested, the left most so; and the mucous membrane of the stomach was in an extreme state of softening.

CASE II. Mrs. J. S., of Buffalo, N. Y., 58 years of age, strong constitution, and the mother of two healthy children, first had symptoms about eight years ago which she for several years imputed to "neuralgia." As a tumour of some kind became apparent, she, in June, 1862, consulted Dr. White, of Buffalo, who diagnosticated an ovarian tumour of the right side. During the following year the tumour increased very little; and in June, 1863, she consulted Dr. A. Flint, Sr., of this city, who referred her to me. I first saw her in October following, when, the tumour not having increased during the last four months, I advised non-interference with it till some more urgent symptoms arose. In June, 1864, I found the patient was suffering from the greatly increased amount of fluid in the sac. During the preceding winter there had been considerable œdema of the legs and feet, but it had now nearly disappeared. On the 16th of July I tapped her, and drew off twenty-eight pounds of a clear fluid from a single sac, the abdomen at this time being forty-seven inches in circumference. For three months afterwards she enjoyed good health, and the fluid did not reaccumulate. By the first of March, 1865, she had, however, increased to forty inches, and being in a condition suitable for the operation, I decided to perform it. On the morning of the 7th she took ℥j ol. ricini, which produced a free evacuation of the bowels. Milk-porridge was the only nourishment given for the two days preceding and the three following the operation. The latter was performed on the 9th of March, 1865, in the presence of Drs. Barker, Emmett, Kammerer, Conant, Field, McQuesten, and Janvrin, of this city, and Dr. P. S. Conner, Assist. Surg. U. S. A. The atmosphere of the room was kept moist by the evaporation of boiling water, and at 78° Fahr.; the bladder was evacuated, and sulph. ether administered;[1] and at 2¼ I commenced the operation with an incision in the linea alba four inches long, extending downward from a point one inch below the umbilicus. But very slight hemorrhage occurred, which was controlled by pressure and torsion of two small arteries. The peritoneal cavity was then opened, the incision through the peritoneum being three and a quarter inches in length. I used a large polished steel sound, as in the preceding operation, to ascertain the existence and extent of adhesions, if any; but found there were only some very slight ones above, to the omentum. The sac was then evacuated by tapping, twelve pounds of a

[1] All these preparations were also made in the preceding operation.

heavy albuminous fluid being drawn off; and the sac itself removed through the incision. A very slight hemorrhage occurred from the omentum where the adhesions had been torn away, which was controlled by the application of one silk ligature. The pedicle was treated precisely as in the preceding case. The right ovary was the one diseased, and the empty sac weighed four and a half pounds. Having sponged the edges of the incision thoroughly, and seen that no blood had entered the peritoneal cavity, and that all oozing from the incision had ceased, I closed the latter throughout its length by seven silver sutures, including the peritoneum. Between the silver sutures were also introduced some superficial silk sutures, which brought the edges into perfect coaptation. A wet compress and flannel bandage were then applied, as in the preceding case. The patient having nearly recovered from the effects of the ether, and the pulse being 80 and of good strength, at 4¼ o'clock I gave gtt. xxx McMunn's elix. opii, and the following report shows her subsequent progress:—

Almost constant retching continued for twenty hours (which was ascribed to the ether), during which time ice was taken, and an enema of gtt. xxv McMunn's elix. opii was used. Some nausea continued through the next day. Reaction was fully established by 11 P. M., and the pulse was constantly between 72 and 82 during the whole period of recovery.

The compress was changed every twelve hours till the incision was finally closed, and the catheter was used every six hours for the first three days only. Fifteen drops of McMunn's elix. opii were given every six to eight hours during the first six days, as demanded by restlessness or pain.

The nourishment was milk-porridge till the first alvine discharge was procured (by enema) on the seventh day, then beef-tea, and soon after some solid food. There was no tympanites at any time, and no tenderness, except for four or five days, over the site of the pedicle. The first suture was removed on the seventh day, the last on the fourteenth day after the operation.

The only complications after the retching was ♁vercome were:—

1. The incision, which had united throughout by first intention, on the sixth day began to suppurate, and gradually reopened (by the eleventh day) at two points, each half an inch long, *down to* the peritoneum, but *not through* it. It discharged from ʒij to ʒiij per day until the twentieth day, when it had again perfectly healed. She was not allowed to sit up till then, though strong enough for several days before.

2. A dysenteric attack occurred on the thirteenth day, which was, however, overcome by the use of hydrarg. protochlorid. cum rheo.

After the twenty-first day the patient sat up all day; and one week thereafter left the city to visit her friends.

Remarks.—1. The first of the preceding cases was a very unfavourable one for ovariotomy. A great depression of the vital powers was shown

from the fact that the œdema of the extremities was not removed after the first tapping. After the operation, also, a slough formed around each of the needles, and in contact with each ligature, used in closing the incision. Besides, she had had little appetite for several months, for which the state of the gastric mucous membrane may account; and her age (40 to 45) is the most unfavourable of all.[1] On the contrary, the other patient was very fortunate in this respect (over 50 years), and also in most others.

2. But both cases illustrate the importance of including *the peritoneum* by the sutures (and needles) used to close the incision. Both incisions were opened by suppuration down to the peritoneum; but the matter in neither case entered the peritoneal cavity, as it must have done, had not the peritoneum been united during the suppuration in the incision. In the second instance the incision reopened without any apparent cause.

3. The first case also demonstrates the position I have assumed[2] respecting the effect of a ligature upon the pedicle, viz., that *no slough of the stump of the pedicle is thus produced*, and that the method of treating the pedicle adopted in these two cases promises the best results.

FIFTH AVENUE HOTEL, NEW YORK, May, 1865.

ART. X.—*Congenital and Hereditary Malposition of the Patellæ.*

By EDWARD T. CASWELL, M. D. (With a wood-cut.)

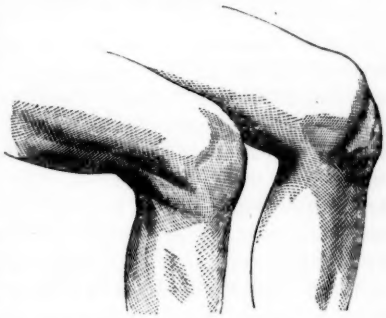
THE following case is of such great rarity that a brief notice of it seems to deserve a place in the records of our profession. Having communicated the facts here presented to some of the most celebrated anatomists and scholars in our profession, gentlemen of wide research and of extensive observation, I learn that neither in their own experience nor in their reading have they met with an analogous case. It is remarkable in itself, and still more so for the hereditary character which it bears.

E. S., aged 43 years, of apparently sound health and good constitution, appeared before me while I was acting as assistant surgeon of enrolment, and claimed exemption from military duty on the ground of "having no knee-pans." Upon examination I found the appearance presented in the accompanying cut. As he sat with the knees bent, the absence of the patellæ from their proper place was very manifest, the surface of the knee forming an inclined plane. The whole edge of the femur, and the edge of the tibia, were distinctly visible beneath the integument, and my finger could be laid upon the head of the tibia without difficulty. The condyles

[1] See my statistics in this Journal, January number, 1865, p. 100.

[2] See my paper on Ovariotomy, Trans. of N. Y. Acad. of Med., vol. 3, part 3.

of the femur, and especially the internal, seemed much enlarged, and for a moment I thought the patellæ were wanting, but upon a closer examination I found that they were placed above the external condyles of the femur on each leg. The left patella was very much smaller than usual, and was very freely movable. The man stated that in his youth he could almost bring it into its proper place. The right patella was somewhat larger than usual, and was much less movable, considerable force being necessary to carry it one-third of the distance towards the middle line. The tendon of the quadriceps on each side preserved its normal relation to the patella, and had consequently an outward direction; the ligamentum patellæ was well pronounced upon the right leg, but on the left it was barely perceptible. The legs were quite shrivelled both above and below the knee.



In addition to his labour as an operative, S. cultivated a small farm. He has always enjoyed good health, and has no apparent tendency to scrofula or any hereditary disease. The malformation inconveniences him only in two ways. He cannot descend a flight of stairs nor walk down hill without exercising great caution, nor can he carry any weight while descending. A burden which he can carry without inconvenience in ascending, he finds it impossible to bring down. The explanation is obvious, and his experience is what one would naturally expect from the existing condition.

He tells me that his father, his sister, his son, and the son of his half-brother by the same father, have all the same malformation. I have every reason to place confidence in his statement. I examined his son, who is about six years of age, and found the same malformation as in the case of the father, but not so well marked. The latter says that his own deformity was less manifest when he was a boy than it now is. Several of my medical friends have seen this curious case, and can substantiate the statements I have made. If a similar deformity has fallen under the notice of other surgeons, it is to be hoped that the profession at large will have the benefit of such observations.

PROVIDENCE, R. I., March 1st, 1865.

ART. XI.—*Excision of Head of Humerus.* By EDWARD R. FELL, M. D., Acting Assist. Surgeon U. S. Army.

CASE I. Jesse Hughes, corporal, 1st Pennsylvania Cavalry; aged 25; farmer prior to enlistment; general health good. Wounded in battle for possession of Weldon Railroad, August 23, 1864; conical ball struck the arm anteriorly, just below the shoulder, and passed out at posterior border of axilla. Admitted to Mower General Hospital, August 29; complained but little, and was in fair condition. Wound did well under simple dressings until September 3, when there were indications of sloughing. Patient was chloroformed, edges of wound incised, and a thorough examination of the injury instituted. A longitudinal fracture of humerus was found to exist (and which it was presumed extended into the joint), extending for about two inches down the continuity of the bone, necessitating excision of head of humerus. It was decided to get the soft parts into a healthy condition before operating. Dressings of solution of permanganate of potassa soon effected this, but the patient seemed to be losing strength. On the 5th excision was decided upon. A flap after the manner of Morel was made across the deltoid, and from the lower edge of the flap an incision of two inches in length; the bone was divided as low down as the fracture extended, after the head had been disarticulated in the usual manner. He rallied and did well, and until the 19th everything was encouraging. On that day he had a chill, soon followed by others. Declining rapidly, he died on the 27th, with all the symptoms of pyæmia. No *post-mortem*. An examination of the bone removed at time of operation showed the fracture to extend as far as the centre of the head of the humerus.

CASE II. J. M. Eckelberger, private 4th Pennsylvania Cavalry; aged 20; labourer prior to enlistment. Wounded at battle of Deep Bottom, Va., August 16, 1864. Admitted to hospital August 29. General health of patient good. Conical ball struck the arm anteriorly, shattering, without fracturing, the humerus one inch below surgical neck. Considerable necrosis soon occurred. Wound treated with simple dressings, and stimulants administered. On the 6th of September a large abscess which formed in the posterior portion of arm was opened; considerable hemorrhage followed, which was arrested by compression. By the 10th the wound commenced sloughing; dressings of solution of permanganate of potassa used. On the 18th secondary hemorrhage from branch of posterior circumflex. A thorough examination was now instituted. Pus had burrowed into the shoulder-joint, and four inches of shaft of humerus was denuded. Patient chloroformed, and excision performed by making an incision from top of shoulder, along posterior border of deltoid, passing through the wound of exit; head disarticulated and removed, with three and a half inches of

shaft. There was very little hemorrhage, and reaction from anæsthesia was prompt. Dry dressings were used for the first few days, after which stimulating dressings were required. Under generous diet and stimulants the man made a good recovery.

CASE III. John Welch, private, 61st New York Infantry; aged 22. Admitted July 22, 1864. Wounded during battle of Wilderness, Va., May 5. Conical ball entered front of left shoulder, two inches below summit; passing through head of humerus, made its exit at outer side, and below spine of scapula. General health of patient good.

July 30. Shoulder more painful than usual; abscess forming; opened August 5, evacuating a large amount of offensive pus.

August 7. Feels better, and rests well at night.

15*th*. Another abscess forming; subsequently discharged through orifice of entrance of the ball.

27*th*. Head of humerus and two inches of shaft removed through an incision five inches in length through posterior border of deltoid. Some branches of posterior circumflex required ligation. Dry dressings used. Under tonics and stimulants the man made a good recovery. During convalescence abscesses formed just beneath the clavicle, and also over the scapula.

CASE IV. Lawrence Turner, private, Co. A, 5th Pennsylvania Cavalry; aged 30. Admitted to hospital June 21, 1864. Wounded June 15, in battle before Petersburg. Conical ball struck the arm four inches below shoulder, at posterior border of deltoid, and passed out on inner surface of arm, comminuting extensively the humerus.

June 22. Wound discharging profusely; angular splint applied.

July 1. Patient getting so much weaker that, after consultation, excision was decided upon. A slightly curved incision six inches in length was made, commencing just below the acromion, passing through the original wound of entrance and slightly towards the anterior border of deltoid. Removed the head and five inches of the shaft of humerus. Wound partially closed by sutures and adhesive strips. Reaction following anæsthesia was prompt.

2*d*. He was placed on a water bed. Tonics and stimulants used freely.

4*th*. Pus burrowing in axilla, for which a compress was used.

5*th*. Patient cheerful; appetite good; slight diarrhœa, controlled by opiate injections; wound suppurating profusely.

6*th*. Diarrhœa troublesome. Large quantities of beef-essence and milk-punch are being administered.

7*th*, 8*th*, *and* 9*th*. Diarrhœa controllable; night-sweats; pulse 102 and feeble; suppuration profuse.

13*th*. Unable to retain nourishment.

Died on the 14th, of exhaustion.

Dr. W. P. Moon, Executive Officer, was the operator in the four cases which are here cited. He expresses a decided preference for an incision along the posterior border of the deltoid in performing these incisions, presenting the following advantages:—

1. Greater facility in removing the head of the humerus, from the fact that by making an incision through the centre of the deltoid, this muscle acts as a clamp when the elbow is depressed backwards to push out the head, and thus interferes with the operation.

Owing to the risk of injury to vessels and nerves in excision of the head of the humerus, the chain saw has not been used.

2. Greater facility for the evacuation of the discharges; as it has been found, as in the cases of Hughes and Turner, and several others which have been received at this hospital from the field, that, where an anterior incision was made, it was nearly impossible to prevent the pus from burrowing and forming abscesses in the axilla and arm, hindering the healing process and endangering extended necrosis of humerus.

3. A more rapid cure, patients recovering in from three to four months instead of six to eight months.

4. Greater rotundity of the shoulder, from less atrophy of muscular structure, and consequently more strength of the arm.

PHILADELPHIA, March 24, 1865.

ART. XII. — *Gunshot Wound of Mouth and Face—Ball lodging in Œsophagus, and subsequently ejected by vomiting.* Reported by DEWITT C. PETERS, Asst. Surg. U. S. A., and Surgeon in Charge of the Jarvis General Hospital, Baltimore, Md.

THOMAS DEERKIN, private Co. H, 107th Penn., age 48, was admitted into Jarvis General Hospital, Feb. 11, 1865, with a gunshot wound of the face and mouth, received at Hatcher's Run, Va., Feb. 6, 1865. The ball, a minie, had struck the tuberosity of the left malar bone, passed backwards, inwards, and slightly downwards, entered the cavity of the mouth. The patient was under the impression that it fell immediately into the gullet and was swallowed.

On admission, the patient's general condition was very good, and he was able to walk about the ward, but he complained of a sense of uneasiness about the precordial region and great difficulty and pain in swallowing, which he stated he had experienced since he received the injury, although his diet had been confined exclusively to liquid nourishments. On the afternoon of Feb'y 16th, in an effort to vomit, which came on suddenly, he ejected a minie ball, and found himself at once relieved of all feelings of

uneasiness and able to swallow without either difficulty or pain. The ball was somewhat flattened and of irregular shape, and had probably lodged in the œsophagus. This patient was transferred to York, Pa., March 11, 1865. At that time the wound had about healed, and he was to all appearances perfectly well.

ART. XIII.—*Therapeutic Effects of the Iodide of Sodium.* By JOHN J. BLACK, M. D., one of the Resident Physicians to the Philadelphia Hospital, Blockley.

AT the suggestion of Professor Gross, this remedy was used in a great measure as a substitute for the iodide of potassium in the venereal wards of the Philadelphia Hospital, Blockley, during the past winter. The dose given ranged from six to ten grains, and most frequently in combination with from one-tenth to one-sixteenth of a grain of the bichloride of mercury three times a day. When giving it alone we generally preferred the following prescription:—

℞.—Sodii iodidi, ℥j; aquæ cinnamomi, f℥j. M.

Twenty-five drops of the above equal about six grains of the iodide of sodium. This form renders the remedy more portable and convenient.

Altogether it was used in forty-eight cases, and in every one the improvement was prompt, marked, and decided. In no instance were the functions of the stomach seriously disturbed, but now and then a patient complained of slight griping pains in the bowels; but these cases were all using the medicine in combination with the bichloride of mercury. None of the patients complained of fulness about the head, dryness of the throat, or coryza. Indeed we are free to say that none of the unpleasant symptoms often attendant upon the administration of the iodide of potassium presented themselves in any of the cases treated. As to its efficacy, it appeared fully to deserve all the encomiums so freely bestowed upon the potassium. Cases as nearly alike as possible were placed, one on the sodium, and one on potassium, and there was no perceptible difference in the progress of each. We believe the two iodides here mentioned to be equally efficient, neither one surpassing the other in results; but we are inclined to think that in a patient in whom the digestive powers are easily disturbed, the iodide of sodium is the remedy to be preferred, and we have no doubt but that it will soon come into general use in this country. I have been informed that the iodide of ammonium, at the suggestion of Professor Gross, has also been freely used in this house, and that the results obtained were most satisfactory. Personally, I have had but little experience with this remedy.

ART. XIV.—*Cystic Encephaloma of the Ovary.* By Jos. G. RICHARDSON, M. D., Union Springs, Cayuga Co., N. Y., late Resident Physician to the Pennsylvania Hospital, Philadelphia.

OVARIAN disease in all its forms, and ovariotomy, have of late years occupied so large a share of the attention of the medical public, that the following notes in relation to a somewhat unusual example of the affection may perhaps excite some interest, detailing, as they do, the rare and fortunate termination by spontaneous rupture of the cyst, within two months of its occurrence.

On the 24th of December, 1864, I was called to visit Mrs. C., a widow lady aged 56, who was suffering severe pain, which she referred to the left side of the abdomen. In that region a decided protuberance was perceptible, of which she gave the following account: Three months ago she first noticed a "bunch" in her left side, low down towards the groin, after running to catch the steamboat, but she suffered no pain in it until about one week since, though it constantly increased in size; for more than a year she had felt inclined to favour that side when turning in bed, &c. She also stated that her husband died about fourteen months since, and that she ceased to menstruate five years ago, but that she has had two or three times within the past three months discharges, about a month apart, similar to the catamenia, but less abundant; during the last year she has lost strength and about fifty pounds in weight, though still by no means emaciated. Her tongue was slightly furred, skin icterode, pulse a little accelerated, bowels inclined to be costive, and urine scanty and high coloured. There was a tumour in the left lumbar region, pressing up the stomach and intestines, reaching down into the pelvis, and nodulated in the left iliac fossa. This tumour was the seat of pain, which was very severe on attempting to rise, turn, or move the left limb, and the tumour was exceedingly sensitive at a point about two inches above and to the left of the umbilicus, though not elsewhere. Examined per vaginam, the os uteri was found normal, but the womb itself was anteverted by a firm rounded tumour pressing forward the posterior wall of the vagina; the same rounded mass was perceptible on examination per rectum, compressing the gut tightly against the sacrum. Under the employment of antiphlogistic and anodyne applications the pain was soon relieved, and in a short time quite disappeared.

During the next few weeks she was seen and examined by several physicians in consultation, one of whom felt satisfied that it was an inflammation of the peritoneum, investing the uterus and ovaries; another, who has practised in this county for nearly fifty years, insisted that it was an enlarged spleen, and nothing else; while a third, who did not see her, after a minute inquiry into the symptoms, decided it was a uterine growth. It appeared, however, that the size and painless course of the tumour rendered *pelvic cellulitis* improbable; while the normal length of the cavity of the womb, as ascertained by Simpson's uterine sound, and the lateral origin of the tumour, negatived the hypothesis of *uterine disease.* In regard to *enlargement* of the *spleen,* although she had suffered from intermittent, yet by careful percussion I was able to mark out that organ in its normal posi-

tion, and the microscope afforded additional evidence by proving the absence of leucocythemia, the relative number of the white and red corpuscles being found, on examination, to retain its natural proportion. By these considerations, and in view of the rapid growth of the tumour, its bossilated character, and the patient's loss of flesh and strength, I was led to the diagnosis of ovarian dropsy, probably originating in carcinomatous disease, and in this opinion Dr. Briggs, of Auburn, the eminent surgeon of this county, fully coincided, after a careful examination.

From the time when I first saw her, when the abdomen measured about thirty-two inches over the crista ilii, the tumour gradually and steadily increased, in spite of various diuretics and alteratives employed at the suggestion of consulting practitioners, until the 6th of February, 1865, when she reached a circumference of thirty-eight inches and a half. On that day her abdomen was softer, and the fluctuation of fluid very distinct; she stated she had felt for a day or two as if something was giving way; in the evening it appeared to her that the tumour burst suddenly, causing her to "feel all gone," as if about to faint; the following morning she passed nearly a quart of pale, light-coloured urine, and during the day micturated six or seven times, about a pint on each occasion, the swelling of the abdomen decreasing almost hourly. On the 14th of February she was so much improved as to ride about a mile down to the village and spend some time with a married daughter, at whose house I examined her, and found that the tumour had almost disappeared, except what felt like a narrow strip of solid substance, situated nearly vertically in the abdomen, in contact with and moulded to the left lateral wall of that cavity; the rest of the belly was soft and flaccid, and, when percussed, yielded the normal clear sound over most of its area.

For about a month from this date I did not see her, but understood that her health constantly improved, and that she considered herself rapidly recovering, although I entertained and expressed to her family but little hope of so fortunate a result. Soon after I learned that she had again commenced to enlarge, and had employed an Indian doctress, who boasted numerous cures of dropsy, and promised to relieve her entirely of her difficulty. When asked where the water was, this old woman told them "it was in the mother," and proceeded to administer various drastic cathartics, among which I subsequently recognized gamboge and aloes; she continued to take those medicines until the 23d of April, when she found, on awaking, that her left leg was discoloured, swollen, and somewhat painful, and the next day, becoming alarmed lest it should mortify, requested my attendance. On entering the room, I was struck by the great emaciation which had occurred, as well as by the extreme debility marked upon her countenance, which, however, were doubtless far less the ravages of disease than the direct results of the violent and prolonged catharsis to which she had been subjected, assisted by her inability to retain food in the irritated stomach. Her symptoms were relieved by appropriate treatment; but the ventral enlargement continuing to increase, on the 28th of April I examined her, in consultation with Dr. Robinson, with a view to decide upon the propriety of paracentesis, and perform the operation if advisable. We found the abdomen measuring about thirty-eight inches at the umbilicus, quite tense, and dull on percussion, the intestines, &c., being pushed upward to the margin of the thorax; fluctuation on the right side was very distinct, but terminated abruptly about two inches to the left of the linea alba, where the hard, firm, nodulated tumour so plainly observable two months before

was very obvious. This mass had apparently doubled its size, was much nearer the median line, and had risen higher in the abdominal cavity. Her respiration was rather laboured; tongue furred; pulse quite weak, and about 100 per minute; but she felt somewhat easier than the night before, and being buoyed up by the hope of another rupture and discharge of the fluid, she desired that the tapping should be postponed a little longer.

On the evening of the day following I was hurriedly called to her bedside, the messenger informing me that she seemed to be dying, and that they wished me to come up and tap her, if it would give any relief. I found her very feeble, with a rapid pulse, occasionally fluttering a little, extremities cold, and respiration hurried and laborious. The unfavourable prospect of any surgical proceeding under the circumstances was explained to the relatives; but it being obvious that she could not continue long in this state the operation was chosen as affording a chance of recovery, and it being then almost midnight I proceeded alone in its performance—the trocar was entered in the linea alba, about two inches below the umbilicus, and nearly sixteen pints of clear yellow serum drawn off; finding the pulse becoming more feeble the canula was withdrawn, and the wound closed with a compress and strips of adhesive plaster. Though her breathing became less and less laborious as the fluid escaped, she complained of feeling so faint that I administered a small quantity of milk punch with a little aromatic spirit of ammonia; this, however, was very soon rejected, and she totally refused to swallow anything else. In spite of sinapisms and other external stimulants, she gradually sank, and died about two hours after the operation.

Autopsy, held May 3d, at 9 A. M., 80 hours after death. Present, Doctors Thompson, Robinson, and Hurd.—Rigor mortis moderate; face and upper extremities much emaciated, but considerable adipose tissue still remaining about the abdomen and lower limbs. An incision was made through the integuments, to the left of the linea alba, about six inches in length, which was afterwards enlarged, until it extended from the mons veneris to the ensiform cartilage, reaching the peritoneum. That membrane was punctured and slit up on a grooved director. Turning back the margins of the incision, the irregular nodulated tumour so distinctly felt from the outside was exposed to view, presenting a smooth and shining appearance, in some parts of a silvery white, in others a dark bluish colour. The cavity of the peritoneum contained about six pints of serum, of a pale yellowish tinge, similar to that drawn off during life. This was carefully sponged out, and the mass was discovered to be adherent to the anterior wall of the abdomen, over a space of some two inches in diameter at the precise spot where the patient complained of such severe pain when first seen by me. These adhesions were easily separated by the fingers, and slight attachments to the jejunum and sigmoid flexure were also very readily ruptured; no adhesions existed within the cavity of the pelvis. Drawing the growth upward and outward, it was at once obvious that it proceeded from the left ovarium; and in order to obtain a more complete view the broad ligaments and vagina were divided, and the whole diseased mass with the uterus and right ovarium, the latter also somewhat affected, was removed.

The tumour was of a very irregular outline, approaching perhaps most nearly to the form of a sphere about seven inches across, flattened from before backward to a diameter of about five inches; on the right side was an irregular rent nearly four inches long, presenting the appearance of hav-

ing been forcibly torn, and opening into a non-flaccid cyst. The edges of this fissure were rounded and non-vascular, and in the opinion of those present were imperfectly cicatrized. The walls of the cyst were about one-sixteenth of an inch in thickness, firm and tough, and apparently condensed from a thinner membrane. Its capacity was estimated at about three pints. The middle third of the growth was of different degrees of solidity, varying from a soft brain-like pulp to an almost cartilaginous hardness; in some portions ulceration seemed to have been set up, while in others cysts ranging in size from a small shot to a marble, were imbedded in more or less firm stromata. On the left side were two cysts, which, though compressed together by their common peritoneal envelope, were separated by a complete septum. The upper one was filled with a chocolate-coloured fluid, while the lower contained a yellow serum, each cavity holding about half a pint. One of these appeared to be multiplying by endogenous growth, its inner surface near the base being studded with a multitude of small cysts, varying from a large pea to a mustard seed in magnitude. The right ovarium was enlarged to the size of a hen's egg, and contained two or three small cysts filled with fluid; the solid portion was of a moderately firm consistence, darker in colour and more vascular than the diseased mass on the opposite side.

The uterus was normal in bulk and texture, but on incision proved to be a good deal congested, and its lining membrane injected of a deep red colour.

In the fold of the broad ligaments on each side of the horns of the uterus was a small conglomerated mass of spherical bodies, not unlike in size and shape to a bunch of currants. The larger ones appeared to be quite ossified, but on section proved to consist of a bony shell filled with a brownish semi-solid substance.

The peritoneum was somewhat reddened, and rather more vascular than in health, but exhibited no patches of effused lymph.

The spleen was perfectly natural in size, and sensible characteristics, and occupied its usual position under the ninth rib.

Kidneys normal in seat, colour, and texture.

Liver, gall-bladder, and intestine presented an entirely healthy appearance.

On microscopical examination of some portions removed from the tumour, the cerebriform pulp was found to exhibit in remarkable abundance the characteristic irregular cells with large nuclei of carcinoma, while the harder parts, though containing numerous indistinct caudate cells, were yet in some places quite fibrous in structure, corresponding perhaps most nearly to the alveolar cancer of recent pathologists. These hardest nodules were pronounced by some of the gentlemen present at the autopsy, scirrhous formations, which, however, Prof. Rokitansky states to occur very rarely in the ovary.

Reviewing this case in the light afforded by the post-mortem examination, it would appear that the pain she was suffering on my first visit was due, as was then inferred, to a local attack of peritonitis, which resulted in the formation of adhesions to the anterior wall of the abdomen, and, that inflammation being subdued, the tumour proceeded in an almost painless course for about six weeks, when the largest cyst did actually, as she supposed, rupture into the cavity of the peritoneum, and its contents being in

great measure absorbed by the peritoneal membrane were discharged through the kidneys. Accompanying the accident only a slight faintness was observable without actual syncope, pain, inflammation, or febrile excitement; and so great was the relief experienced by the patient that there is little doubt that its occurrence, fortunate as it seemed at first, was in reality the means of at least abbreviating her existence, inducing her, as it did, not only to refuse the operation of ovariotomy which I proposed to her, but also the palliative proceeding of paracentesis, until too late to be of service. It would likewise seem probable that the cyst after its rupture gradually contracted, continuing to secrete fluid, which on account of the absorbent power of the peritoneum failing (from its surface becoming irritated, and its circulation interfered with by the increasing pressure of the tumour with its secondary cysts), gradually accumulated in the abdominal cavity and gave rise to the dyspnœa and other painful symptoms, which finally forced her to seek relief from a surgical imitation of Nature's former cure, performed, alas, without Nature's original success.

In regard to the excision of the tumour or rather tumours, for the removal of both ovaria would, of course, have been necessary, although the demonstration of cancer cells in the solid portion would throw some doubt on the probable permanency of the cure by successful operation; yet the slight character of the adhesions, the size of the principal growth rendering extraction through the small incision after puncturing the cysts feasible, the slenderness of the pedicle, and especially the previous good health and vigorous constitution of the patient, both of whom are now living at the advanced age of ninety years and upwards, must, I think, place this in the category of cases in which ovariotomy would probably have been accompanied with success.

TRANSACTIONS OF SOCIETIES.

Art. XV.—*Summary of the Transactions of the College of Physicians of Philadelphia.*

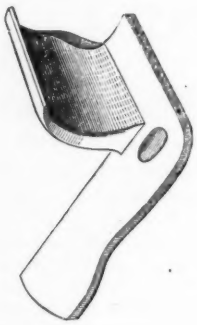
1864. *June* 1. *Spotted Fever.*—Dr. D. Gilbert said that among the cases reported by him to the college, at the meeting in March last, there was one of a boy, aged seven years (see number of this Journal for July, 1864, p. 141), who was attacked about three weeks previously, and had progressed favourably under the use of large doses of quinia and stimulants. This case continued to do well, and about the 1st of April became convalescent, so that on the 10th he ceased attending him. He was again summoned on the evening of the 20th of April, when he found the patient totally insensible, with pupils dilated, pulse small and frequent, &c. On inquiry he learned that the boy had not had any alvine evacuation for the last three or four days, and that on that day he had eaten an unusually large quantity of indigestible food. Everything possible was done to relieve the brain, procure discharges from the alimentary canal, and sustain the system, but in vain. He died on the next morning. Dr. G. stated that on the 6th of March last he was called to another well characterized case of this peculiar disease, in the person of a lady, aged about twenty-five years, residing in Stiles Street. The eruption appeared on the second day. Without entering into a full account of the case, he said that his object was merely to bring it before the college as additional proof of the value of quinia in large doses in the treatment of this malady. He gave this patient four grains every hour until ʒj was taken, then the same quantity every two hours for a day or two, and finally every four hours, keeping her thus fully cinchonized until after the tenth day, when convalescence commenced. This patient recovered fully in about three weeks. Dr. Stillé saw the case, at Dr. G.'s request, on the fifth day.

Oct. 5. *Splint for Fractures of the Lower part of the Humerus.*

Dr. Packard exhibited a splint employed by him with advantage in cases of fracture of the humerus, especially when the lesion is seated at or below the middle of the bone.

For many years it was the custom in this city to use the external and internal angular splints devised by Dr. Physick for cases of this kind. Not very long ago, however, there was substituted for these (by whom I have been unable to ascertain) a single angular splint, hollowed out so as to fit the anterior surface of the arm, forearm, and hand; the hand being of course kept in a state of supination. In many cases this splint answered an excellent purpose, especially when there was used in addition to it a posterior pasteboard case for the lower part of the arm. But the supine position of the hand is not comfortable when long kept up, and the want of lateral support at the seat of injury sometimes gave rise to angular deformity.

It therefore occurred to me to add to the inside angular splint a piece shaped like the arm-part of the anterior angular splint, and this is the simple principle of the splint I now exhibit. The thick inner edge of the hollowed anterior part is fastened by nails to the edge of the upper portion of the inside splint. Its lower edge is carefully cut away, rounded, and smoothed to fit across the bend of the elbow. Its upper edge is pared down internally so as to form with that of the inside splint a line corresponding to the shape of the anterior wall of the axilla. It is upon the correctness of these lines above and below that the accuracy of the fit of the whole splint depends, and hence also its comfort and efficiency.



The annexed sketch will serve to illustrate still further the explanation now given, although the part for the anterior face of the arm is represented very much too wide. I am in the habit of having the splint made upon a rather large measurement, cutting it down to fit each special case. Several times I have had it made by carpenters entirely unused to splint making, but have had no difficulty in giving them the idea.

The patient's comfort is further promoted by cutting away the under edge of the forearm part of the splint so as to allow the hand to be somewhat abducted, as in Bond's splint. The hollow at *c* for the inner condyle is important in this as in all the other internal angular splints. Should the condyle be very prominent, or the arm very thin, it is better to make a hole here, rounding its edges very carefully.

Dec. 7. Death from Hemorrhage caused by a Sharp Sequestrum cutting the Popliteal Artery. Dr. HUNT reported the following case:—

J. P., aged 19, was admitted to the Pennsylvania Hospital Nov. 9, 1864, after an alarming hemorrhage, which came through sinuses communicating with dead bone in the popliteal space. His countenance was pale and anxious, pulse frequent, quick, and small, tongue glazed, dry, and aphthous, respiration hurried, bowels costive, and abdomen meteoric. He had slight delirium at night, and constant jactitation. Old sinuses and cicatrices pointed to necrosis, the origin of which was uncertain, but was supposed to have been first caused by a fall on the ice in the winter of 1861–2. As there was no bleeding at the time of admission, the full extent of the necrosis was not ascertained, as a thorough exploration would have endangered a return of the hemorrhage. Perfect rest, nourishing food, persulphate of iron, and chlorate of potash were prescribed. A bandage was applied to the limb, which had become œdematous, and it was also elevated. At this time slight pulsation could be detected in the tibial arteries. On consultation it was determined that if the hemorrhage returned to etherize the patient, open the wound, and amputate or ligate, according to the results of the exploration. The patient's comfort was greatly improved, but his general condition cannot be said to have responded to the treatment. The condition of hydræmia into which he was thrown from the great loss of blood before entering the hospital, gave very poor hopes of recovery.

A drop of his blood on a glass slide, spread over a much greater space and coagulated in much wider meshes than healthy blood.

Under the microscope there was a marked diminution of red and an increase of white corpuseles. On Sunday, Nov. 20th, an alarming hemorrhage commenced, but it was promptly checked by compresses and the tourniquet. From this time pulsation in the tibial vessels entirely ceased. The patient was so weak as to forbid operation when the attending surgeon arrived.

On Tuesday following, about three ounces of blood were lost, after which the patient gradually sank and died on Wednesday night. The whole amount of blood lost, while in the hospital, did not exceed six or eight fluid ounces.

Autopsy.—No examination of the viscera permitted. The connective tissue around the wound was infiltrated with serum and lymph. The muscular interspaces were filled with decomposing blood, and broken down tissues, including those of the nerves and bloodvessels, which were involved in the general pulpy mass. An external sinus communicated directly with the femur, which was partly denuded, and on the posterior surface of which was a large cloaca with thickened and rounded edges; from this there projected inwards and downwards a very sharp *movable sequestrum*, which was three inches in length, and which compressed and finally cut across the main artery directly after its passage through the great adductor tendon. The medullary cavity was obliterated for the space of two inches above the seat of disease. The specimen is in the museum of the College of Physicians.

On the Use of the Sulphite of Soda in the Treatment of Erysipelas.

Dr. ADDINELL HEWSON stated that he had been using the solution of sulphite of soda as a local application in erysipelas since February, 1864, and had obtained results from it in the various forms of that disease which were to him both interesting and surprising. He had been induced to try it from the representations made by Prof. Polli of its influence in destroying all disease of a cryptogamic or animalcular origin—a source to which recent researches would lead us to suppose erysipelas was due. At first he administered it internally, in doses of ten grains every two hours, as well as applied it locally, but the effects of the local use were so prompt and decided that he has now abandoned its internal use altogether as unnecessary. In extensive trials of this remedy, both in hospital and private practice, he has never seen it fail when thoroughly applied before the deep planes of cellular tissue had been invaded by the disease. Under the latter circumstance no positive curative results were of course to be expected from its mere external use. But before such parts had become affected a solution of ten grains of this salt to the ounce of water when thoroughly applied on lint all over the surface affected and to a considerable distance beyond it and covered with oiled silk to prevent the evaporation of the solution, had not only produced a decided bleaching effect on the discoloured surface in every such instance in the first twenty-four hours of its use, but had invariably destroyed all traces of the disease in forty-eight hours from its first application. The result was the same whether the application was made in the traumatic or idiopathic form of the disease. He had thus cured twenty-seven cases, seven of which were of idiopathic erysipelas. Even in the cases where the deep planes of cellular tissue were involved as well as the surface, the disease on the surface was always apparently affected by the application. It was most positively bleached in all instances, and in

many was evidently destroyed, within the period above stated, even whilst that in the deeper parts proceeded on steadily to suppuration.

1865. *Feb.* 1. *Two Cases of Aneurism.*—Dr. JOHN ASHHURST, Jr., communicated the following account of two cases of aneurism.

CASE I. *Popliteal aneurism; deligation of femoral artery; recovery.*—Joseph Fleming, private Co. C, 157th Regt. Penna. Vols., was admitted to the Cuyler U. S. A. Hospital at Germantown, on June 6th, 1864, having been transferred from St. Paul's Church Hospital, Alexandria, Va. Upon examination I found him to be suffering from a well-marked aneurism of the popliteal artery of the right side. The tumour was about the size of a duck's egg, the pulsation being strong and diffused over the whole tumour, the *bruit* loud, but the thrill not very well defined. He kept his leg in a semiflexed position, and complained of constant pain, referred to the tumour and to the ankle of the same side. The limb below the aneurism was somewhat œdematous, dusky, and pitting slightly on pressure.

He stated that he had first observed the tumour some months previously (he could not fix the exact date) after severe exertion in lifting heavy stones. The tumour had gradually though slowly increased in size, and the pain in his limb had latterly become more intense. The only treatment to which he had been subjected before his admission to Cuyler Hospital, was, according to his own statement, the application of an ointment, and of a liquid which from his description appears to have been the tincture of iodine.

There seemed to be no disposition to disease of the arteries in any other part of the body, and physical examination showed the heart to be perfectly healthy.

Bearing in mind Mr. Syme's case in which coagulation and a spontaneous cure were effected by the simple application of a bandage to the limb, this plan was tried, the patient being strictly confined to his bed. No success following this method, forced flexion was next employed, the leg being bent upon the thigh and firmly fixed by numerous turns of a "figure of eight" bandage. This mode of treatment likewise proving unavailing, pressure by means of an instrument resembling Signorini's tourniquet was resorted to, but was found equally ineffective with the means previously employed.

The aneurism in the mean while was steadily enlarging, and the risk of venous obstruction becoming daily more imminent. I therefore resolved to tie the femoral artery at the lower angle of Scarpa's space, which was accordingly done in the usual manner on June 16th, 1864. Anæsthesia was induced by the use of ether, and the vessel reached by an incision about three inches in length. The hemorrhage during the operation scarcely exceeded a fluidrachm. The pulsation in the tumour ceased instantly upon the tightening of the ligature. The edges of the wound were then brought together by hare-lip pins and several points of the interrupted suture (lead wire being the material employed) and lightly dressed with a dry dressing of sheet lint. The entire limb below the wound was at the same time enveloped in carded cotton. The temperature of the affected limb was at first slightly above that of the opposite side, but soon became normal and so remained. When the state of anæsthesia passed off the patient complained of a burning pain in the heel and ankle, which, however, soon disappeared.

The tumour in a few hours became hard (showing that a clot had formed), and gradually diminished in size, there not being at any time recurrent pulsation. The wound healed almost throughout by adhesion, the ligature

dropping on the seventeenth day, and the progress of the patient to recovery being uninterrupted. The application of cotton to the limb was discontinued after the fifth day. On September the first the wound was entirely healed; a firm tumour was still perceptible in the popliteal space; there was no pulsation to be felt in the tibial arteries.

In reviewing any successful case of an operation so serious as to its prognosis as ligature of the femoral artery, it is important to discover, if possible, whether the successful issue be attributable to any peculiarity in the operation itself, or in the after treatment of the patient. The average mortality after this operation is quite one in three; rather more therefore than after amputation of the thigh. And the statistics of the operation show that its fatal result has in most instances been due to gangrene of the limb below the wound. The prevailing idea in the profession is that the gangrene is due to the interrupted arterial supply, and hence the great anxiety felt that the collateral circulation should be established.

But this idea in the case of aneurism is erroneous, as has been shown among others by Porter in his valuable monograph. In these cases the risk of gangrene is from pressure on the venous trunks from the coagulation of the blood in the tumour itself. And this is one reason why in many situations the "old operation," or that of Antyllus is better than the Hunterian; because the sac being there opened and the clots turned out all risk of venous obstruction is prevented. For the same reason where the Hunterian operation is preferred, as is generally the case in popliteal aneurism, it is important that the operation should be performed early, before the tumour has enlarged to such an extent as to embarrass the free return of blood from the parts below. It is to the observance of this rule in the case just narrated, where the operation was resorted to as soon as it became evident that it was necessary, that the successful issue is to be attributed; neither the operation nor its after treatment having offered any points differing from the ordinary course of such cases.

CASE II. *Traumatic aneurism of the brachial artery.*—For the notes of the following case I am indebted to Dr. John M. Leedom, Acting Assistant Surgeon U. S. A., in whose ward the patient was treated.

David Smith, private Co. "E," 6th Pa. Cavalry, 29 years of age, was admitted to Cuyler U. S. Army hospital on the 29th of June, 1864; he had been wounded by a conical ball on the 12th of the same month, at Trevillian Station; the ball having been extracted on the field from the pectoral muscle of the left side in which it had lodged. The ball had passed transversely across the upper part of the patient's left arm, grazing the brachial artery in its course. His wounds were perfectly healthy and almost cicatrized when he came under observation in this hospital.

The attention of Dr. Leedom was first called prominently to the condition of the artery, by the pain and numbness which the patient experienced in the limb, especially referred to the course of distribution of the ulnar nerve. At the same time the arm became swollen and somewhat œdematous, and a large, pyriform, pulsating tumour was developed over the upper third of the artery. The thrill and *bruit*, though not very well marked, were sufficiently distinct to leave no doubt as to the nature of the affection. A small superficial abscess had formed over the tumour, and had opened externally.

On the 16th of July, 1864, the patient having been brought thoroughly

under the influence of an anæsthetic mixture (ether and chloroform), an incision was made into the sac, the clots which it contained rapidly turned out, and the opening in the artery being compressed by the finger of an assistant, two ligatures were passed by means of an aneurismal needle, and secured respectively one above and the other below the point of hemorrhage. The lips of the incision were then carefully adjusted with metallic sutures (silver wire), and the limb below the point of ligation wrapped in carded cotton.

With the exception of a chill, which occurred the next day, but was not repeated, the case progressed favourably until the morning of the fifth day after the operation, when profuse secondary hemorrhage, to the estimated amount of 21 ounces, necessitated the opening of the wound. It was now found that one of the ligatures had become partially detached, and the case was treated as one of wounded artery from any other cause, fresh ligatures being applied above and below the bleeding point. No further hemorrhage occurred for thirteen days, when, August 3d, 1864, a second bleeding, to the amount of about 16 ounces, required the wound again to be opened; a ligature was placed this time upon the artery as it emerged from the anterior fold of the axilla. Two days later there was still another hemorrhage, evidently from the distal end of the vessel, and, as the patient was by this time much exhausted by repeated loss of blood, the arm was promptly removed at the shoulder joint by Assistant Surgeon Schell, U. S. A., the surgeon in charge, a flap being obtained from the belly of the deltoid muscle. The ligature which had been placed upon the axillary artery two days previously was suffered to remain, and rendered the operation materially easier; not more than six ounces of blood were lost upon this occasion.

It should be stated that shortly after the first attack of hemorrhage (July 21st), the affected arm became the seat of phlegmonous erysipelas, running on to suppuration, and giving rise to two large ulcers, one over the inner condyle of the humerus, and the other a short distance above. Whether owing to the cacoplastic state of the blood consequent upon this erysipelas, or whether the blood had lost its coagulability from the repeated hemorrhages themselves, amputation, which generally suffices to prevent all further bleeding, did not in this case accomplish the desired result; for the stump had to be opened within thirty-six hours to check a fresh hemorrhage. The blood on this occasion appeared to ooze from the muscular tissue, rather than to proceed from a vessel of any great size, and was controlled by pressure and the application of a solution of the per sulphate of iron.

The next day, Aug. 7th, the main ligature on the axillary artery became detached, and of course a profuse jet of arterial blood ensued. The hemorrhage was, however, quickly arrested by the pressure of a finger, and again deligation was practised high up in the axilla; the wound of amputation being prolonged towards the clavicle. Still another and a final hemorrhage occurred on the evening of the next day, August 8th, also from the axillary artery, its ligature being again loosened by the ulcerative process. The vessel was once more tied as it emerged from beneath the clavicle: the patient survived the last operation about two hours.

No *post-mortem* examination was made, owing to the anxiety of the relatives to remove the corpse.

As in recording any successful case it is important to reflect whether

there were any peculiarities of treatment to which in particular the successful result is to be attributed, so when unfortunately the issue is unfavourable it behooves the surgeon to review carefully the course he has pursued, and ascertain, if possible, if in any respect he might have acted more judiciously. Would a different procedure at the outset have probably resulted more satisfactorily? Would any other course at the beginning have been justifiable under all the circumstances of the case? At what point in the history of this case began the series of phenomena which terminated with death? What modification of treatment, if any, might have averted the fatal issue?

In answering the first of these questions it must be remembered that the arm was greatly swollen, exceedingly painful, and that gangrene from venous obstruction was daily if not hourly imminent; moreover, the fact that the skin was broken over the sac by a superficial abscess, rendered it not impossible that rupture and fatal hemorrhage might occur at any moment. Hence that operative interference was necessary was unquestionable. There were three operations which suggested themselves at this juncture, viz., ligature of the subclavian artery, amputation at the shoulder joint, and the "old operation" for aneurism which was performed.

Even if tying the subclavian artery were not so often attended as it is with an evil result, it promised but little in this case; for the great risk of gangrene from venous obstruction could not but be increased by the coagulation and hardening of the blood in the tumour; and hence this operation was promptly and as I think properly rejected. Amputation at the shoulder joint, if performed at the beginning, would probably have been successful; but would it under the circumstances have been justifiable? The "old operation" as performed, promised quite as well as amputation, and had over it the great advantage of probably preserving limb as well as life. By opening the sac all venous congestion was at once removed, and the limb placed in the most favourable condition for recovery. The risk of secondary hemorrhage, which was the principal remaining danger, would have been about equal after either operation, and after amputation would have certainly been attended with more immediately serious consequences. Hence the first and second questions of our criticism may, I think, be answered in the negative: no other course promised better, and, under the circumstances, any different plan would have been scarcely justifiable.

The answer to the third question is more doubtful. This man was exposed to the same hygienic and meteoric influences before as after his first hemorrhage, yet erysipelas was not developed, till, by loss of blood, his system was depressed to the point where the erysipelatous influence could produce its effect. On the other hand, in spite of the condition of his limb, he did comparatively well for thirteen days, the second hemorrhage not recurring until that period. But this and the subsequent bleedings might not have occurred had not the plasticity of the blood been interfered with by the erysipelatous affection. It is, therefore, impossible to fix the exact point at which the fatal sequence of events began.

Would an amputation at the time of the first hemorrhage have altered the final issue? Probably it would; but the same reasoning that caused its rejection in the first instance, rendered it unadvisable at this juncture. Should the limb have been sacrificed when invaded by erysipelas? Amputation through an erysipelatous member, though occasionally successful, is more frequently followed by a rapid death, and hence should not be per-

formed except when seeming to afford the only though but a faint chance of recovery.

Upon the whole, then, in a careful review of the case, whose unfortunate history has been detailed, it does not appear that any different treatment would have offered a more favourable prospect. Possibly an amputation on the night of the second hemorrhage, Aug. 2d, might have been successful; but the chance would have been but possible, not probable. There are a great many circumstances that cannot be noted in a written history, which combine to determine a surgeon as to the course proper to be pursued in any individual case; and it is very seldom that it can be said definitely, that if one thing had been done, or another omitted, the results and termination would have been different.

Art. XVI.—*Summary of the Proceedings of the Pathological Society of Philadelphia.*

1865. *Jan.* 25. *Case of Penetrating Wound of Lung.*—Dr. John Ashhurst, Jr., stated that for the notes of the following case, and for the opportunity of presenting the same to the Society, he was indebted to Dr. C. R. Prall, Acting Assistant Surgeon U. S. A., by whom the patient was treated.

Charles F., a private of Co. "A," 51st Pa. Vols., 26 years of age, was admitted to the Cuyler General Hospital at Germantown, Pa., on the 31st of May, 1864, suffering from a wound received in the battle of the Wilderness, on the 13th of the same month.

He stated that he fell, stunned, when first wounded; and that he remained in an insensible condition for some time. From the beginning he experienced great difficulty of breathing, with but little pain.

When first seen by Dr. Prall, he was found to have a slight grazing wound upon the nose and left cheek, and a small wound immediately above the left clavicle, at its middle third. This wound was healthy, granulating, and presented no evidence of having penetrated beyond the parietes.

The constant dyspnœa from which this patient suffered aroused suspicion of some internal lesion, and the signs elicited by a careful physical exploration confirmed the same idea. There was slight dulness posteriorly at the root of the left lung, and a somewhat loose crepitation in the same locality. Anteriorly the left side of the chest was dull on percussion below, and unnaturally resonant above. The vesicular murmur was but faintly heard at the upper part of the lung, and below was masked by a rough friction sound combined with a blowing amphoric respiration as of air passing in and out of a large cavity through a contracted opening. These signs remained pretty much constant on the left side, except that the line of dulness encroached gradually in an upward direction, while the only sound heard by auscultation in the latter period was a deep-seated friction sound below, as from plastic effusion of no very recent date.

A few days after admission an intercurrent pleuro-pneumonia attacked the middle lobe of the right lung, characterized by the usual physical and rational signs, and ran its course without eventually altering the condition of the patient.

The diagnosis from these observations was a penetrating wound of the left pleural cavity, with some injury to the lung itself, and the ball probably remaining in the chest; pneumothorax, and a gradually increasing amount of effusion, whether serous or otherwise, could not be positively determined.

This effusion finally increased to such an extent as to thrust the heart over towards the right side, so that during the last twenty-four hours of life, the apex-beat bore almost the same relation towards the right nipple that it would have done in health towards the left. At the same time the heart's action was irregular, and so impeded as to render it probable that there was pericardial effusion also.

The treatment, of course, was merely palliative, aiming to mitigate suf-

fering and prolong life. The fatal issue was postponed until June 19th, twenty days after admission to hospital and thirty-seven from the reception of the wound.

An autopsy was made, fifteen hours after death, with the following results:—

Rigor-mortis moderately well marked; cadaver well nourished; the wounds were completely cicatrized.

Thorax only examined. On opening the chest, a gush of pus mingled with serum proceeded from the left pleural cavity. The left lung was completely collapsed, and compressed against the vertebral column; and the heart, as had been diagnosticated during life, much displaced towards the right side. The pleura was covered with old coagulable lymph, and its cavity contained not less than three quarts of serum mingled with pus. The ball, conical in shape, was found to have entered the cavity of the chest in an almost vertical direction, between the second and third ribs, splintering the latter near its vertebral articulation.

Several spiculæ of bone were found at this point, imbedded in the lung. The ball had then passed downwards striking the last rib, also near its vertebral articulation, loosening and partially displacing it inwards, without, however, producing any fracture. The ball itself was found lodged upon the diaphragm, and partially encysted.

The right pleura was covered in patches with coagulable lymph, and its cavity contained a certain amount of serous effusion. The lung appeared to have resumed its healthy condition. The pericardial sac contained about four ounces of serum, the heart itself appearing perfectly normal.

From the above enumeration of pathological phenomena it can be seen how very closely the *post-mortem* appearances conformed to the lesions indicated during life by physical exploration.

A practical question suggested by this history, is whether the operation of paracentesis should have been performed. Had the ball not lodged in the chest it would have been clearly indicated; but with the foreign body remaining, though it might have prolonged life, it would appear that it could not eventually have averted the fatal issue.

Specimen of Cystic Tumour of the Axilla.—Dr. JOHN ASHHURST, Jr., presented a tumour which was removed from a patient in the Episcopal Hospital, who was admitted during the service of his colleague, Dr. John H. Packard. It was situated low down in the left axilla, and was removed by careful dissection, the patient being under the influence of ether. The cyst was ruptured during the operation, and discharged about two fluid-ounces of a semi-fluid substance of a yellowish-white color. The entire cyst was removed, and the wound is rapidly closing by adhesion. The tumour was about the size of a hen's egg.

Dr. Packard had previously operated upon the same patient for the removal of a precisely similar but rather larger tumour situated on the back. The apparent death of this patient from chloroform, during that operation, has been graphically described by Dr. Packard, in the January number of the *American Journal of the Medical Sciences.*

The induction of and recovery from anæsthesia, in Dr. Ashhurst's operation, were attended by no unusual phenomena, except that the stage of excitement was slightly prolonged, and the amount of ether used rather larger than is generally required.

Metastatic Abscesses following Erysipelas.—Dr. JOHN ASHHURST, Jr., Feb. 22d, related the following case:—

John Farlow, private Co. "C," 28th P. V., aged 44 years, entered the Cuyler Hospital, March 29th, 1864. While at home on furlough he had been attacked with erysipelas, which affected his right lower extremity. When first seen by Dr. Wm. R. Dunton, in whose ward the patient was placed, his limb was found red and swollen, the tumefaction reaching to the middle of the thigh; the colour was livid, and the temperature of the inflamed parts lower than normal. The constitutional condition of the patient was at the same time typhoid in the extreme. After the erysipelatous blush had begun to subside, which occurred about the 10th of April, it was found that the knee-joint was very much swollen and evidently distended with fluid. This distension increased for about a week, and then gradually diminished. A few weeks later (in the early part of May) the left knee-joint began to swell, and finally attained the size of a man's head, when it pointed, opened spontaneously, and discharged about one pint of pus. About this time a bed-sore formed over the sacrum, and rapidly enlarged; another formed shortly after over the right hip. The discharge from the left knee-joint ceased a few days before death, but began again the day of the fatal issue, which ensued on June 3d, 1864.

The treatment throughout had been nutritious, tonic, and stimulating, with the local application of mucilaginous washes.

An autopsy was made twenty-four hours after death with the following results: Absolutely no *rigor-mortis* whatever; the cadaver was much emaciated, with great swelling of both lower extremities. The head was not examined. There was some hypostatic congestion of the lungs, and the cardiac cavities contained fibrinous clots: no other abnormal appearances in the thoracic viscera. The liver was very fatty, and slightly larger than normal; the other abdominal organs seemed healthy. An incision was made into the right knee-joint, and gave exit to not less than a pint of pus; the articulating surfaces of femur and tibia were found much eroded, nearly all cartilaginous structure having disappeared. A similar condition of things prevailed on the left side. The purulent deposit on the left side being considered secondary or "metastatic," the great venous trunks on the right, and the ascending cava were carefully examined, without any traces of phlebitis or of purulent absorption being detected.

Case of Idiopathic Erysipelas.—Dr. JOHN ASHHURST, Jr., communicated the following:—

James H. was admitted to the Episcopal Hospital on January 20, 1865, to be treated for a simple fracture of one of the metacarpal bones of the right hand.

He was an Irishman, a weaver by trade, and stated his age at 45, though his appearance would have given the impression that he was at least 15 years older. The injury was treated in the usual way, and he was about to be discharged, when, on the 5th of February, he complained of chilliness and a slight sore-throat; on the 7th the throat affection had increased; there was considerable swelling and submucous infiltration, especially involving the uvula, and a tendency to the exudation of a tough yellowish matter, which came away in shreds like a false membrane. At the same time there was a good deal of constitutional disturbance, characterized by a dry and furred tongue, hot skin, and rapid but feeble pulse. The next day (8th) the characteristic flush of erysipelas appeared upon his face.

During the whole course of the disease the throat symptoms remained the most prominent part of the affection; the parotid and submaxillary glands became also enlarged and indurated. On the 13th, while all the local manifestations of the disease were much ameliorated, the constitutional condition of the patient had become decidedly worse, the pulse being exceedingly compressible, and *subsultus tendinum* and low muttering delirium being constantly present. He died on the morning of the 14th of February, that being the ninth day of the disease.

An autopsy was made about six hours after death. The examination was necessarily incomplete, on account of the anxiety of the relatives to remove the corpse, and the only parts, therefore, examined were the throat, chest, and abdomen.

The entire tract of the larynx, trachea, and bronchi, was actually inflamed, the erysipelatous eruption having travelled downwards in the course of the air-passages.

There were occasional patches of tenacious exudation, and in one point at the lower part of the trachea a small ulcer. The larynx and one of the tracheal rings were ossified.

The lungs were somewhat congested posteriorly, and the heart contained large fibrinous clots. The blood in the other parts of the body was exceedingly black, and of a consistence approaching to that of molasses.

The liver was exceedingly contracted, not more than half the usual size, though of normal weight (about 54 oz.). It presented a perfect specimen of the "hob-nail" form of cirrhosis, with a tendency to fatty degeneration. The other organs examined appeared healthy.

March 22. *Hairs in Ovarian Cyst.*—DR. HUTCHINSON exhibited the specimen, and gave the following history of the case from which it was derived:—

Mary R., æt. 45, was admitted into the Episcopal Hospital Nov. 12, 1864, with ovarian dropsy.

She said that she had had but one child, which was delivered with forceps, and lived only three weeks, and that the dropsy commenced immediately after birth of her child, and that during the twenty years which had since elapsed, she had menstruated irregularly and been tapped four times; the liquid obtained being always of the colour of porter. Upon taking charge of her on the first of the present year, I found her emaciated and feeble, her abdomen moderately distended, and yielding on percussion on its whole anterior surface, from the symphysis pubis to the ensiform cartilage, a flat sound—the enlargement being rather greater on the left side; change of position effected no change in the physical signs.

By means of a vaginal examination, I discovered that the uterus was very much prolapsed but otherwise healthy.

There was no disease of the heart, lungs, nor of any of the important viscera. No enlargement of the external abdominal veins, and but little œdema of the feet and legs.

She died Jan. 27, 1865.

The autopsy was made sixteen hours after death.

Head not examined.

The organs contained in the thoracic cavity were healthy, but were suffering from the effects of pressure.

Upon opening abdomen, it was found that the dropsy had taken its origin from the left ovary, and that the cyst was tightly adherent to the

abdominal walls, extending from the pelvic cavity to the ensiform cartilage and compressing the intestines against the spinal cord.

The right ovary was converted into a caseous mass, and contained a quantity of hair.

Drs. D. Hayes Agnew and Edward Rhoads, being appointed a committee to investigate the structure of the hair found in the ovary, made the following report:—

April 12. Dr. Edward Rhoads presented the following report in regard to the preceding case: The hairs found in the ovarian cyst presented by Dr. Jas. H. Hutchinson were identical in their structure with hairs upon the surface of the body. Each possessed a cortical portion of imbricated scales, a medullary substance, and a bulbous extremity; this last being attached to no stationary papilla but loosely imbedded in the cheesy or sebaceous matter. The hairs varied in thickness, and in length from $\frac{1}{4}$ to $1\frac{1}{2}$ inch; their colour was usually reddish-yellow, occasionally brown; no regularity appeared in their distribution. The occurrence of hair in ovarian cysts is noted by a number of observers, but only a few accurate investigations are recorded. Lebert gives merely a plate of the hairy mass, hairs, and "matière sebacé." Rokitansky, Hewitt, and others make incidental mention of their occasional presence. In the proceedings of the Obstet. Soc. of Edinburgh (*Edin. Med. Journal*, vol. 7, p. 886), we find reports of two cases, by Dr. Gillespie and A. R. Simpson. From that of the latter we quote "On opening the sac a considerable ball of loosely tangled hair was found lying in its interior, and two or three long hairs of a similar kind were seen growing from follicles in a skin-like patch on the posterior wall, toward its lower end. * * * He (Dr. Alex. Simpson) was not aware whether any observation had ever been made in such cases in regard to the colour of the hair, but in the case which he had brought under the notice of the Society, the hair contained in the ovarian cyst was strikingly like that growing on the head and pubes of the patient, and it would be interesting to know whether this obtained as a general law."

"Dr. Gillespie stated that the hair contained in the cyst he had exhibited, was of the same colour as that on the surface of the patient's body."

Dr. Hutchinson states that there was not this correspondence in the case under consideration, the cystic hairs being reddish-yellow, those upon the head brown.

March 22. *Surgical Fever.*—Dr. RHOADS in presenting these specimens said: They have not the charm of novelty, but certainly do possess whatever of interest attaches to a disease of dangerous character and frequent occurrence, and the pathological, but more especially the therapeutical relations of which are imperfectly understood. They were taken from the body of a young man who died on Tuesday, March 21st, after an illness of seventeen days. He entered the Pennsylvania Hospital eighteen hours after a car-wheel passed over the anterior portion of his left foot, comminuting the bones of the part and tearing the soft tissues. Amputation at the tarso-metatarsal articulation was at once performed by Dr. Morton. The plantar flap sloughed, but the dead portion soon separated, leaving the wound covered with healthy granulations. Beyond the ordinary irritation consequent upon such an operation and frequent restlessness, no marked constitutional symptoms presented themselves until Sunday, March 12th. On the preceding Friday some redness and swelling appeared in front of his ankle along the edge of the dorsal flap, and two small subcutaneous abscesses formed there,

no material change occurring in the wound's appearance. On Sunday afternoon a severe chill, half an hour in duration, ushered in an irregular series of rigors ending only with death. A few hours later red lines appeared, commencing in front of the ankle and extending obliquely upward and inward to the inner side of the knee. With the redness there were swelling and induration. These continued together to the middle of the thigh, and then *ceased abruptly*. The left inguinal glands were, however, much enlarged. On Thursday a circumscribed subcutaneous abscess, which had formed on the inner aspect of the leg, about midway between the ankle and knee, was opened, and, resting upon the deep fascia forming its floor, appeared the internal saphena vein. This was distended and quite firm. Through a puncture made in its walls with a bistoury, exuded abundantly no blood, but a thick puruloid fluid, exhibiting under the microscope much granular matter with corpuscles (uni-and bi-nuclear, but usually granular or fatty), and coloured flakes, evidently altered hæmatin. Blood from the patient's finger at this time contained a positive increase in the number of white nucleated corpuscles. The general symptoms had assumed the most decided character—persistent rigors, irregular as to time of occurrence, severity and duration; colliquative sweats, macerating the skin, the hue, the shrivelled fingers, the heavy odour, the dull, lethargic expression of countenance, the uneasy passive delirium, the rapid pulse and hurried respiration, the dry tongue, the tympanitic abdomen and diarrhœa, the heavy alkaline urine, slightly albuminious, with its copious deposit of phosphates and urates, combined to render the case complete and unmistakable. There were moist rales, too, in the lung, with coarse friction sound and cough. After the first chill the wound ceased to produce healthy pus, discharging sanious fluid merely.

Constitutional treatment.—Potass. permang. Later tr. ferri chlor. and quin. sulph. with alcoholic stimulus and beef-tea. Local emollient applications to leg—yeast poultice and permang. potash to stump.

Autopsy.—Thorax. Lungs congested, but everywhere inflatable except in the dark areas surrounding the numerous scattered abscesses. Pleura for the most part covered with a cheesy, straw-coloured exudation, and bathed in abundant fluid grumous with flocculi of the same. Heart healthy in appearance; its chambers filled with fluid blood and soft coagula.

Abdomen. Liver large, its cells healthy. Spleen slightly increased in size. Mesenteric gland conspicuous; intestine distended with gas. Peyer's patches distinct, presenting the dotted ("shaven-beard") appearance. Kidneys rather large, with engorged capillaries, containing frequent points of stasis or coagulation, both in the anastomosing network and in the convolutions of the glomerules.

The blood everywhere contained *very many* white corpuscles with one, two, sometimes three, distinct, and frequently reniform nuclei; the red appearing darker than in health, readily giving up their colouring matter to water, and more disposed to cohere in masses than to arrange themselves in rolls. All the lymphatic glands on the left side of the pelvis and in the corresponding groin were much swollen. The internal saphena vein and its branches as far as the middle of the thigh (at a point corresponding to the cessation of the external redness and induration) contained no blood but the puruloid fluid before mentioned, from which the hæmatin flakes, noticed five days previously, had now disappeared. Above the point in the thigh the vein was entirely occluded by a firm clot, the lower end of which gradually dissolved into the matter below. The same condition obtained

in the deep veins, but there the changes had not progressed so far; and in the vessels of the opposite limb no abnormal appearances presented themselves.

Without at this time entering into a discussion of the various theories advanced in connection with this disease, permit me to call attention to the following facts ascertained in the case under consideration:—

1st. The evident irritation of the lymphatics of the part, and swelling of their glands above with corpuscles exactly resembling those occurring in large numbers everywhere through the blood.

2d. The impossibility of the white venous fluid entering the general circulation from which it was separated by a firm coagulum entirely closing the vessel.

3d. That this white venous fluid was evidently the debris of a clot, as shown by its microscopic characters, particularly the early presence and later absence of hæmatin flakes, and the general granular and fatty rather than nucleated structure of the corpuscles.

4th. That the corpuscles of the blood and lymphatic glands were different from the corpuscles of the venous fluid.

April 12. *Interstitial and Necrobiotic Degeneration of Muscle.*—Dr. RHOADS exhibited the specimen and made the following remarks:—

The patient from whom this specimen was removed, had suffered for 18 years with strumous disease (anchylosis and tumour) of the knee-joint. The muscles of the thigh had been long entirely unemployed; those below the knee were used slightly in moving the foot. These latter were pale, atrophied, and had undergone interstitial fatty degeneration. The fibres preserved their transverse striæ well marked, but instead of their connecting tissue appeared bead-like rows of fat vesicles. The muscles of the thigh were represented by yellow masses retaining the original shape merely, and exhibiting under the microscope absolute elemental fatty degeneration, as well as much fat in the interspaces. Very rarely could any trace whatever of the original striation be discovered, but sheaths empty and collapsed, or filled and transparent with oil; or retaining it in small globules mingled with granular matter, filled the field.

Case of General Tuberculosis in a Child.—Dr. JOHN M. LEEDOM communicated the following case of this:—

Mary K., the little patient from whom this specimen was obtained, had been suffering for about seven years with general tuberculous disease, which first manifested itself in the form of hydrocephalus. The acute symptoms of this affection yielded to treatment, though the head always remained unnaturally large. She went through all the diseases to which childhood is generally liable, I myself having attended her in measles, scarlet fever, and hooping-cough. She dragged on a miserable existence until the night of the 5th of the present month (March, 1865), when an attack of more than ordinary oppression terminated her brief career.

A *post-mortem* examination was made thirty-six hours after death, with the following results: Rigor mortis well marked. On opening the chest, masses of tuberculous matter about the size of nutmegs were found in the walls of the pericardium, which contained about one pint of fluid. Both surfaces were much roughened, that of the heart presenting a peculiar honeycombed appearance. The pleura was studded with tuberculous deposits, roughened in patches, and adherent to the anterior thoracic parietes.

Both lungs were infiltrated with tubercle, and around the bifurcation of the bronchi were large tuberculous masses, which creaked under the knife like scirrhus. The liver was extremely enlarged, and also infiltrated with tubercle. The spleen, pancreas, and kidneys were also tuberculous; the latter organs, however, less than those previously mentioned. The wishes of the parents prevented any examination of the head.

This case is of interest on account of the extent and diffusion of the tuberculous deposit, and the youth of the patient.

April 12. *Gangrene of Foot, following Typhoid Fever.*—Dr. THOS. H. ANDREWS exhibited the specimen and read the history of the case from which it was derived, as follows:—

Jno. Mullen, aged 23; labourer; a native of Ireland; a man of not very good habits, oftentimes drinking to excess, but always enjoying good health, with the exception of an attack of intermittent fever and one of primary syphilis several years ago, which to a slight extent undermined his constitution. On the 29th of last November he was seized with a chill, headache, pain in back and limbs, deficient appetite, great restlessness, &c. He continued at his work, however, for a day or two, but at last was obliged to take to his bed. He immediately called in a physician, who told him he had typhus fever, of which disease there were a number of cases in his neighbourhood. His symptoms gradually increased in severity, until at last he sank into a state of stupor, in which condition he remained for two weeks, after which he began to convalesce. He says that he felt himself so well that he got out of bed; but, upon arising, discovered that he was very weak, and that his limbs felt stiff. He remained out of bed for several hours, when he began to suffer intense pain in both feet, more especially in the right one, which was swollen. He immediately returned to bed, and called in his physician, who made an incision on the dorsal aspect of the foot, which gave exit to nothing but blood, and afforded no relief. The swelling continued, and at night the foot had assumed an intensely livid appearance, and before two days had passed became black. The gangrene extended very slowly up the leg, until about six weeks ago, when a line of demarcation formed, and ulceration separated the soft structures of the gangrenous from the healthy part.

He was admitted into the Pennsylvania Hospital, April 4, 1865, in a debilitated condition, the pulse being frequent, feeble, &c. Tonics and good nutritious diet were immediately ordered, the part being dressed with a solution of permanganate of potassa, to correct fetor. Amputation was performed four days later, by the ordinary flap operation, there being at the time very little bleeding, and it being necessary to use only two ligatures.

On examination of the artery, we found its walls thin. Under the microscope it appeared healthy, except where the fibres of the external coat contained oil, there being no atheromatous or calcareous degeneration. The microscope revealed an advanced state of fatty degeneration of the muscles, their striæ being obscured or obliterated by yellow granules and small oil-globules, and their interstitial tissue replaced by fat.

On the Pathology of Secondary or Metastatic Abscesses.—Dr. JOHN ASHHURST, Jr., read the following paper:—

The subject of metastatic abscesses, and the pathological theories which have at various times been advanced in attempting to explain their occurrence, have more than once been discussed and commented upon at meetings

of this Society; and in the first volume of our proceedings may be found an elaborate and excellent paper by Dr. Packard upon the subject. As it is to be presumed that this paper and the doctrines it embodies are familiar to most members of the Society, I shall not scruple to make free use of it, and to accept the authorities there quoted without in all cases going back to the originals.

The prevailing theories of the formation of metastatic abscesses, even at the present day, are expressed in the several terms pyæmia, purulent absorption, and purulent infection. I propose to examine very briefly the circumstances under which metastatic, or as they might more correctly be termed secondary, abscesses arise, and to ascertain, if possible, what are actually the pathological conditions to which they are due. Let us suppose a typical case; an amputation or resection has been performed for an injury in a perfectly healthy person; the wound is suppurating freely, and everything promises well, when without apparent cause repeated rigors are experienced, the patient falls into a typhoid condition, and dies with his lungs, liver, and perhaps other parts of his body filled with collections of what is shown by all the tests applied to be pus. There seem, at the first glance, to be three organic systems by the agency of which these secondary deposits might possibly have been produced; these are the lymphatic, the vascular, and the nervous systems respectively. Let us inquire in turn how far each of these may have been concerned. That an abscess, which is in one sense certainly secondary, may be due to the influence of the lymphatic vessels, is a matter of frequent observation; as when a felon is accompanied by inflammation of the lymphatic glands at the elbow and in the axilla, inflammation which may run on to suppuration; but the abscess thus formed is not the metastatic or secondary abscess which forms the subject of the present investigation. And, indeed, as clearly pointed out by Virchow,[1] the structure of the lymphatic glands of itself prevents pus as such from entering the system through this medium; for the pus corpuscles will almost certainly be arrested in the very first glands to which they come, while "even the fluids which succeed in passing them, will during that passage lose a great part of their noxious properties." Hence it may, I think, be safely asserted that the lymphatic system is not concerned in the production of the so-called metastatic abscesses.

The second possible medium of communication which we are to consider is that by means of the bloodvessel system, capillaries and veins. And the name pyæmia presents itself as a most convenient and plausible explanation. Pus-blood (as it is anglicized by Dr. Swaine, the translator of Rokitansky), if a fact, would seem to leave no further room for discussion; and here our arguments in the negative may be stated under three heads, viz: 1. Pus does not enter and is not formed in the blood. 1. Pus has never been found in the blood. 3. If pus be injected into the blood, it does not cause the formation of metastatic abscesses.

The idea that pus is actually absorbed by bloodvessels, or finds its entrance by openings, pathological or artificial, is, I believe, no longer seriously entertained by any one. In fact, as remarked by Virchow, in the rare case of an abscess forming a communication with a vein, hemorrhage is more likely to result than any purulent absorption.

The liquid part of pus (liquor puris) may indeed enter the vascular sys-

[1] Cellular Pathology, Chance's translation, p. 184.

tem, as happens in the spontaneous absorption of abscesses; of which phenomenon a number of instances may be found detailed in the *Medical Times and Gazette* for March 20, 1858; but the fluid part merely of pus is not pus, nor is its absorption attended by any of the symptoms of *pyæmia* so-called. But though generally acknowledged that pus cannot enter the vascular system from without, it is still maintained by some surgeons that it is produced in the veins themselves as a consequence of suppurative phlebitis. But this suppurative phlebitis is not a primary affection; a clot, as shown by Cruveilhier, is always present first. Moreover, this phlebitis is an affection strictly of the walls of the vessel, not of its contents. The process as traced by Virchow is as follows: A clot is formed in a vessel from some cause mechanical or otherwise. This clot or "thrombus" softens and disintegrates from its centre, forming a whitish, puriform, but not purulent liquid. The thrombus, in the meanwhile, is augmented by fresh depositions at its extremities, and by the time the cavity forming within it has reached the walls of the vessels, the contained *débris* are effectually sealed from the circulating blood. "Only sideways does the softening extend, until it at last reaches the wall of the vessel itself; this becomes altered, it begins to grow thicker, and, at the same time, cloudy, and ultimately even suppuration takes place within the walls."[1] Our first point may, therefore, I think, be considered as established, viz., *that pus does not enter, and is not formed in the blood.*

The assertion that pus has never been observed in the blood may be sustained by the fact recorded by Virchow, p. 164, that "*a pus corpuscle can be distinguished from a colourless blood cell by nothing else than its mode of origin;*" and there is no doubt in my own mind that those cases, in which it has been supposed that pus was detected in the blood, were really instances of leucocytosis or leukæmia, and not of pyæmia, which name in the words of Virchow "must as designating a definite change in the blood be entirely abandoned."

The third point proposed needs no further demonstration than the experiments of Sedillot referred to by Dr. Packard, in the paper already quoted. That distinguished surgeon made the crucial observation of repeatedly introducing pus into the veins of lower animals, without eliciting any marked results.

While, however, the bloodvessel system is not, as has been seen, directly concerned in the production of metastatic abscesses, it is indeed the seat of a process, to which in the immense majority of cases these secondary formations are due. And this process is that which Virchow has so beautifully traced out, and to which he has given the name of *thrombosis.*

It may be remembered that in speaking of suppurative phlebitis, the observations of Cruveilhier were referred to, showing that the formation of a clot is the initial step of the process. Now, in the case of amputation or resection, which we have supposed, clots are formed in the neighbouring bloodvessels. If everything goes well, if the patient be not weakened by hemorrhage, nor attacked with erysipelas, or other source of depression following the operation, these clots will, in all probability, be absorbed or organized,[2] and the wound will heal without further difficulty or delay. But, if the surrounding circumstances be not so favourable, these clots or *thrombi* may run on to softening and degeneration; a whitish, granular, puriform, but not *purulent* substance is developed in the centre of the clot,

[1] Op. citat., p. 203. [2] See Paget's Surgical Pathology, p. 134, etc.

and gradually extending to the walls of the vessel, produces a "peri or mesophlebitis," followed by genuine suppuration of the vessel's walls and the surrounding areolar tissue. Thus are produced the abscesses in the immediate neighbourhood of a wound, which so frequently occur after operations in overcrowded hospital wards.

Again, these thrombi enlarge by accretion until they project into the neighbouring venous trunks; and then, by the returning current of blood, small portions may be detached and carried to points more or less distant from the place of original formation; these fragments or *emboli* may be even carried through the heart and the arterial system into any organ or structure of the body to which the vascular system penetrates, and by the same process of peri-phlebitis give rise to abscesses in the lungs, liver, spleen, connective tissue, or even in the joints, the articular cartilages becoming diseased from the embolism of vessels in their immediate neighbourhood. In more favourable cases these emboli (the metastatic coagula of Rokitansky) may be redissolved, and give rise to no further trouble.[1]

From this simple exposition of Virchow, which seems to me to bear the stamp of truth upon its face, we may, I think, conclude that the formation of metastatic or secondary abscesses is due to this process of *thrombosis* and *embolia*, if not in all, at least in the immense majority of cases. The same explanation is clearly applicable to the hepatic and pulmonary abscesses which follow upon fractures and other injuries of the head; and in this way suppuration might occur in distant organs, even without pus existing at the original seat of injury.

There are, however, some cases of secondary purulent formations, which though perhaps explicable by the theory of thrombosis, as above enunciated, seem to have a more probable explanation in the action of the nervous system. It is the prevailing tendency at the present day to account for every morbid condition by the doctrines of humoral pathology; and even Virchow has assisted in throwing undeserved disrepute upon the solidists or neuropathologists. That various modifications in the functional activity of different parts of the body may be communicated by sympathy, or more definitely by *reflex action*, has been the subject of repeated observations from the classical case related by Graves[2] where the prick of a needle produced reflex paralysis of sensibility, down to the brilliant observations of our fellow members, Drs. Mitchell and Morehouse, at the Christian St. Hospital.[3] It is, moreover, well established that modifications of nutrition and secretion can be produced through the medium of the nervous system. The sympathetic inflammation of one eye from an injury to the other has been repeatedly noticed by ophthalmic surgeons, and Mr. J. Vose Solomon has reported a very interesting case, in which inflammation of the sound eye followed the introduction of a glass mask into the orbit from which its diseased fellow had been some time previously removed.[4] Other examples of modified nutrition are given by Drs. Mitchell, Morehouse, and Keen in their essay on *Gunshot Wounds and other Injuries of Nerves.*[5]

Now, suppuration is but the third stage of inflammation,[6] and as we have seen that inflammation in its early stages may be transmitted by reflex action through the nervous system, it is at least highly probable that

[1] Rokitansky; Pathological Anatomy, Syd. Soc. Trans., vol. i. p. 168.
[2] Clinical Medicine, p. 344.
[3] Circular No. 6, Surg. Gen. Office U. S. A., March 10, 1864.
[4] Dublin Quar. Journ., Feb. 1863.
[5] See especially case of Schively, p. 87.
[6] Gross, Pathol. Anat., p. 72.

suppuration may be reflexively induced in a like manner. And there are certain cases of symmetrical purulent formations, which it would be difficult to account for in any other way. I had the honour of reporting a case of this kind to the Society in the month of February of the present year. Idiopathic erysipelas of one lower extremity had been followed by suppuration in the knee-joint, and a month later an abscess in the opposite knee-joint was formed, the autopsy showing no purulent deposits in any other part of the body. Now, although this might have been produced by thrombosis, I confess the balance of probability to my mind is decidedly in favour of the second abscess being a reflex phenomenon.

To sum up, then, abscesses, in one sense secondary, may be produced through absorption by the lymphatic system; but the suppuration thus caused could never extend beyond the first lymphatic gland, which would form an insuperable barrier to the further passage of pus. Pyæmia is a most unfortunate misnomer, for in no sense is the blood the actual means of purulent transfer, though through the medium of the vascular system, by the processes of thrombosis and embolia, secondary or metastatic abscesses are indeed produced. Some cases again of symmetrical suppuration are best accounted for by the action of the nervous system, according to well-known physiological and pathological laws.

The phenomenon of shivering, which so frequently accompanies the process of secondary or metastatic suppuration, may, I think, be plausibly attributed to the influence on the nervous system of the sudden cutting off of the blood supply by the process of embolia; just as the sudden diminution in the supply of blood to the brain, by ligation of the carotid artery, is not unfrequently followed by convulsions.

I cannot conclude this brief sketch of the process of secondary suppuration, without referring to the theory of a "pyogenic diathesis," so ingeniously and ably advocated by Dr. Packard in the paper already frequently quoted. I cannot give my assent to this theory, for the simple reason that I do not see its necessity; the occurrence of secondary abscesses after injuries or surgical diseases can, I think, in all cases be satisfactorily accounted for on established mechanical and physiological principles, while I look upon the suppuration following typhoid and other fevers, as simply symptoms of those diseases, which may not indeed be present in every case, but which are just as much a part of the several affections in which they occur, as are their characteristic eruptions or any other pathological lesions which we take for granted, without assuming any special diathesis to account for them.

I have not complicated this paper with any allusions to the conditions denominated by Virchow *ichorrhæmia* and *septhæmia*, which are entirely distinct from the pathological state which gives rise to the secondary or metastatic abscesses that have been considered.

REVIEWS.

ART. XVII.—*A Treatise on Military Surgery and Hygiene.* By FRANK HASTINGS HAMILTON, M. D., late Lieutenant-Colonel, Medical Inspector U. S. A.; Professor of Military Surgery and Hygiene, and of Fractures and Dislocations in Bellevue Medical College; Surgeon to Bellevue Hospital; Prof. of Military Surgery, &c., in Long Island College Hospital; Author of Treatise on Fractures and Dislocations and of a Practical Treatise on Military Surgery. Illustrated with 127 engravings. 8vo. New York: Baillière Brothers, 1865. pp. 648.

THIS volume contains twenty-six chapters. Following the introduction are seven which treat respectively of the examination of troops, their general hygiene, their accommodation in tents, barracks, huts, &c., of hospitals, preparations for the field, the hygienic management of troops upon the march, and the conveyance of sick and wounded soldiers; the remaining chapters are devoted to the consideration of the injuries received in warfare, and of those diseases to which soldiers are more particularly subject, with a final one on the employment of anæsthetics in major amputations and in other severe surgical operations after gunshot injuries.

The introduction is mainly devoted to the question of the military position of medical officers, the rank, and the authority they should enjoy. This question is one more delicate to treat than difficult to decide. It cannot be denied that the medical officers are entitled to the gradations of rank precisely as other officers are, and that they have been unjustly treated by Congress in its legislation on the subject. They should be on the same footing with the other staff officers. Common sense would seem to show that the medical directors of armies, corps, and divisions should have the same rank as the chief quartermaster, chief commissary of subsistence, chief engineer, chief of ordnance, &c., of the same bodies. Medical officers should have the same authority in their departments that other staff officers have in theirs, no more and no less, and in all respects should be subject to the commanding officers, precisely as are other officers. In the case of a regiment, which is always theoretically commanded by a colonel, or of a smaller body of men, or a detached garrison, the medical officer should be subject to the orders of the commanding officer, no matter what his rank may be. Any other principle than that which recognizes that the officer highest in rank in the line of the army shall command is erroneous, and will lead to disaster. No quartermaster, commissary of subsistence, engineer, or other staff officer can command troops except by virtue of a regimental commission, if he has one, and the surgeons should obey the same rule.

The line officers, in an army officered by intelligent men, who have been brought up to their profession, or who have learned it by experience in the field, are well acquainted with the various subjects of the diet and dress of soldiers, details of camps, receipts for food, tents, soldiers' houses, equipments, &c. The medical officer who interferes in such matters will meet

with opposition, and properly so. In fact, the relations between the medical and line officers would in a well organized army make such interference almost impossible, and should it occur, it would show that one has gone beyond or the other has fallen behind his duty.

An instance, showing that officers who have thoroughly learned their professions can take care of their men, is given at page 93, in the chapter on the general hygiene of troops, where Dr. Hamilton cites the cases of the 7th Massachusetts Regiment, Colonel Russel, and the 2d Rhode Island, Colonel F. Wheaton. Col. Russel, we know, entered the army from West Point in 1845, and Col. Wheaton entered from civil life in 1855. Dr. H. says:—

"In our opinion the effectiveness, value, and bravery of these two regiments were no less due to the splendid talents of their respective colonels than to the perfect system of camp police maintained from day to day by surgeons Holman and Carr."

Now the camp police of a regiment is the charge of the officer of the day, a line officer. Is it not quite likely that these two efficient colonels required not only the officer of the day, but also Surgeons Holman and Carr, to do their duty, and that, therefore, the camp police maintained from day to day was perfect?

In the seven chapters of this work following the introductory one, the titles of which have been given above, we do not find much to comment upon. They contain a great deal of useful advice upon the various topics to which they are devoted. At page 76, three meals a day are said to be necessary for a soldier. Soldiers who are on a march soon get used to two meals a day. Old soldiers never take more than two. The division of the men into squads of three or five for cooking the food, as recommended by Dr. H., is not, we conceive, a good one. Where camp kettles can be carried the cooking should be by companies. The men can then make soup, and soup has been universally acknowledged to be the best constant diet for the soldier. When the cooking is done in small messes, as here recommended, soup cannot be made.

The remaining eighteen chapters, are, as already stated, devoted to military surgery.

Three years since, we laid before the readers of this journal, an account collected from the works of Scrive, Longmore, Guthrie, and Macleod, of the surgical experience of the Crimean Campaign, and on the same occasion took a brief glance at the then condition of the surgery of war. Since then a large hospital experience during the civil war in this country, and the valuable observations and memoirs contributed by others, have led us to modify or change our views in regard to many points connected with military surgery. We propose, on the present occasion, briefly to state some of these changes, and also to indicate some points which appear to us to demand more attention than they have yet received. While doing this, we shall refer to what is taught and also to what is omitted in the volume before us.

According to our observation, the common opinion as to the action of conical balls is not correct. It is not their point that always first strikes, for they have been found imbedded in the epiphysis of a bone by the base. They do not go straight forward, without deviating in their course from the resistance of tissues, as we have witnessed in innumerable instances. In one the ball entered alongside of the nose below the eye, and after divid-

ing the portio dura on the same side, lodged in the hollow of the back of the neck, whence we removed it. We have taken several balls from the walls of the chest, when the wound of entrance was on the opposite side, and there was no reason to suppose that the cavity of the chest had been traversed. We recall an instance where a ball was removed from the anterior wall of the abdomen, the contents of which showed no symptom of lesion, that had entered one of the buttocks and had broken off a small sharp piece from the ilium of the same side near the superior spinous process. That the splitting of a conical ball cannot occur, and that it never touches a bone more gently than to occasion its utter destruction, as Macleod puts it, we have by no means found to be the case. We have again and again removed a ball in several pieces from a limb when the bone had been struck and not broken. In one instance we removed a foreign body from above the elbow-joint, on the internal edge of the humerus, on account of the pain complained of in the terminal branches of the ulnar nerve, the skin had entirely healed over, and there was no trouble whatever at the seat of injury; it was a ball cut by the sharp edge of the bone almost exactly into two, still united by a very thin piece of lead, lying against the humerus, which was not broken. We recollect removing a conical ball from the external condyle of the right femur, where it was imbedded in the bony tissue, without having splintered the bone. In another case, which we remember pointing out to Inspector-General Muir, of the British army, who told us the man would die unless the limb were removed, in which he was mistaken, there was a hole through the lower end of the tibia from before backward, and no splintering of the bone had taken place, at least none in the direction of the ankle-joint.[1] Lastly, as regards the extraction of conical balls, we have not found it to be more difficult than to remove a spherical one; indeed we have found the contrary to be the case, as the latter are decidedly more difficult to seize hold of.

In the local treatment of gunshot wounds, water dressings at the temperature agreeable to the patient are very generally conceded to be the best. The advice given by Dr. Hamilton (pp. 205 *et seq.*) on this point is good, as is also that in regard to the application at the proper time, of the roller bandage, the advantage of which, when well applied, cannot be overestimated. The abuse of the probe and the rough handling of the parts have been so well commented upon by Dr. Hamilton that we will transcribe what he says on this subject:—

"It ought to be well understood that granulations, whether forming in the track of a sinus or at the surface, must be treated with great tenderness; any lesion of their delicate structure, whether occasioned by a probe, by the dressings, or by pressure with the hands, and which is sufficient to cause them to bleed, is hurtful; the lesion thus produced must be again repaired, additional inflammation and suppuration result, as a direct consequence of the injury, and in a greater degree the suppuration is increased and rendered more acrid, indirectly by the decomposition of the blood which remains. The simple act of introducing a probe into an irritable sinus very often develops an irritative fever which continues several days, and not unfrequently determines an erysipelatous inflammation which results in death. . . . . Violent pressure with the hand up and down a limb, in order that the last drop of pus may be forced out, is more hurtful to the patient than probing, just in proportion as it is more painful. . . . . Caution must be exercised even in the removal of detached fragments of bone, when patients are exhausted by long suppuration."

[1] The injury in this case may not have proceeded from a conical ball, but this is not probable.

Contrary to what is very generally said by modern authors in regard to the use of the trepan, while we believe we have cause to regret not having had recourse to it in some gunshot wounds of the head, we always were pleased with the result when we did so. As the subject is one of great difficulty and of particular importance, and moreover, as very little has been written on the subject during the war, we will briefly relate some of these cases, that the reader may draw his own inference as to what they teach. There is no more difficult point to decide in practice than the extent to which surgical interference shall go in the treatment of similar cases.

CASE I. Lewis Duball, private Co. K, 12th Maine, æt. 21, was wounded on the 19th October, 1864, and admitted on the 23d to the Satterlee U. S. General Hospital.[1] We saw this patient for the first time on the 10th November. Until then he had been kept quiet, and upon low diet with water dressings to the scalp. He was comatose, and the right upper extremity was paralyzed. There was a gunshot wound about the middle of the left frontal bone, which was fractured, the fracture being about four inches in length, and running directly backwards; the edges of bone were depressed, and there were several small pieces lying loose between them. The loose pieces of bone were removed, and the depressed portions elevated. The dura mater was found intact. The man improved at once, so that five days afterwards he was walking about the ward entirely free from any symptom of nervous disorder. His recovery was perfect.

CASE II. Riverius H. Trask, private Co. H, 114th N. Y. Vols., æt. 23, was admitted from Sandy Hook Hospital, Maryland, September 25th, 1864, with a gunshot wound of the head received in the battle of Winchester, Virginia, September 19th. He said he had been slightly stunned by the blow; his mind was confused, and his articulation difficult. The ball had passed antero-posteriorly over the left frontal protuberance, producing a seemingly slight flesh wound about half an inch wide and one inch long. The man's general health was good, and the wound looked healthy. He complained, however, of a dull heavy pain just over the left brow, and the pupils of the eyes appeared to be rather dilated. Ordered to keep quiet, on low diet, with water dressings to the wound. September 26th, pain more severe, and pupils more dilated. On the 27th, the man had a severe epileptic fit, that lasted about forty-five minutes; and remained afterwards in a state of semi-consciousness, with a pulse full, regular, and very slow; pupils much dilated; and for two hours after the convulsion the respiration was stertorous.

On the following day an anæsthetic was administered,[2] and a free crucial incision of the scalp over the wound, then almost cicatrized, was made. A well-marked depressed fracture of the bone was found. By the elevator, about one and a half square inches of the outer table were removed. The inner table was then found to be fissured, and nearly the same amount of it was taken away. The dura mater was found greatly congested. On recovering from the effects of the anæsthetic, the man seemed to breathe more freely, and said that he had less pain than before the operation. Two teaspoonfuls of the solution of morphia were given, and repeated in two hours, so that he remained perfectly quiet; no food whatever was

[1] To avoid repetition, we will state that all the cases here related or referred to were observed in this hospital.

[2] For this purpose a mixture of sulphuric ether (three parts) and of chloroform (one part) was always employed.

allowed for the first day, and for twelve days he was not permitted to have any other nourishment than the essence of beef. On account of an attack of erysipelas of the head and face, that began on the fourth day of the operation and lasted for about one week, the tincture of the chloride of iron was administered freely for several days. On the 11th October, some light food was allowed in addition to the essence of beef; and on the 20th, he was placed on full diet. By the middle of November, the wound—the edges of which we made no attempt to bring together—had closed, and the man was perfectly well.

CASE III. Herman L. Page, corporal Co. K, 1st Mass. Artillery, æt. 20 years. Was wounded at Petersburg, June 17, 1864, by a ball (minié, in all probability) which struck the head at a tangent, about the posterior internal portion of the left parietal bone. At the bottom of the wound in the scalp, which was about two inches in length, the bone was denuded of periosteum, and several small bits of lead were tightly fixed in its small irregularities. The wound was healthy, and the man appeared perfectly well in all respects, when he was found speechless and paralyzed in his bed in the morning of the 3d July. By means of the trepan, on the same day, the outer table of the part of the cranium denuded of periosteum was removed; no fissure was found in it, and the diploe seemed healthy. Some improvement in the motions of the tongue was supposed to be witnessed, and further proceedings were postponed. Purgation by croton oil was practised. The next day, the 4th, the man being in the same condition, the trepan was applied to the inner table, a fissure, oval shaped, one inch in the long by half an inch in the short diameter, was then discovered. This fissure would not admit of the introduction of a finely pointed quill tooth-pick, and the bone was not loosened or depressed. This bony portion was removed, and beneath it the dura mater was found highly congested. A purulent collection was feared underneath this place; but it was judged most prudent not to incise the cerebral membranes. The man died at 4 A. M. of the 7th July.

At the autopsy, a large abscess was found, filled with fetid pus, extending from the top of the left cerebral hemisphere to its base.

CASE IV. William H. Burger, sergeant in Co. K, 47th Pa. Vols., was admitted Oct. 25, 1864, from Regimental Hospital, with a transverse scalp wound one and a half inch in length, on the left side of the head, over the frontal bone, near the coronal suture and the junction of the left frontal and parietal bones. The wound, said by the man to be from a piece of shell, was received at Cedar Creek, Virginia, October 19th. The bone was denuded of periosteum the whole length of the wound; no fracture was discovered. The man complained very little; the wound was healthy; there was diarrhœa for several days after admission. The right side became partially paralyzed; the pupils became dilated; on the 27th the man had a slight chill; his feces were discharged involuntarily; the paralysis increased; on the 28th there was a severe chill; he died on the 5th November.

At the *post-mortem* examination, on removing the scalp the portion of bone underneath the wound presented a dull white appearance. The external table was fissured on the left side of the longitudinal sinus; the fissure running across the sinus about a quarter inch, and separating the sagittal suture in its passage. On removing the calvarium a fissure with a depression of the internal table was discovered just to the left of the longitudinal sinus. The vessels of the membranes of the brain were much congested, and some pus was found on the surface of the dura mater. The

dura mater itself presented a dark, almost gangrenous, appearance. Under the dura mater, immediately beneath the wound, was found a large abscess involving nearly one-half of the left cerebral hemisphere, extending nearly to the left lateral ventricle. The remaining half of the right lateral ventricle was much softened by the infiltration of serum. In the posterior base of the right lateral ventricle was found a small quantity of pus.

Our experience, then, in injuries of the head, and this is true of civil as well as military practice, would lead us to adopt a different course from what we usually find advised by modern surgical writers.

To turn to the book before us, Dr. Hamilton believes that the patient's chances of recovery are better if left alone than if we proceed to operate (p. 237), and he says that "in trephining, sufficient additional injury is often caused to turn the balance in the scale against recovery" (p. 238). Several original cases of gunshot injuries to the head are given "to illustrate how much nature can accomplish under the most unfavourable circumstances, without aid from the surgeon." In one of injury (at page 242) at the back part of the occipital bone, the man was walking about and feeling well on the 24th day when Dr. H. saw him. In another (same page) where the skull was fractured and depressed—we are not told in what place—the man was improving rapidly, after having had delirium and convulsions, at the expiration of four weeks. That such cases signify nothing, however, from the short time they were under observation, may be learned from others afterwards related by Dr. H. himself. There are two of penetrating gunshot wounds of the head at page 244; in one no cerebral symptoms manifested themselves until about seven weeks after the receipt of the injury, and at the end of eight the man died from the formation of abscess in the anterior lobes of the brain. In the other during the first eight weeks no cerebral symptoms were present, and at the expiration of ten the man was dead.

Before leaving this subject of gunshot injuries of the head, we will relate a case of at least temporary recovery, where the ball entered the cavity of the cranium, as an interesting surgical curiosity, and also with the hope of being enabled thereby to hear its eventual termination.

George Guptill, private, Co. K, 29th Maine, æt. 24. Admitted Oct. 23, 1864. He was wounded on the 19th, at Cedar Creek, Virginia. The ball passed through the upper lid of the left eye, which was destroyed, and penetrated the orbital plate of the frontal bone. Several pieces of the orbital plate that were loose were removed. The man was kept on his back on a rigid diet, in a dark room, with cold-water dressings over the wound. No attempt was made to find the ball further than by the introduction of the finger into the wound. The pulse was decidedly *cerebral*, slow and irregular.

The man had an attack of erysipelas during the first ten days after the receipt of the injury. For several days about the beginning of November he complained greatly of pain and twitching of the muscles in the feet. Occasionally he had headache. On the 20th November he was allowed to sit up for the first time. On the 7th January, the wound, which had been kept open as long as any discharge issued, had closed, and he was discharged apparently well a few days afterwards.

Of what we have seen of injuries to the spinal column and its contents we have nothing to say, from our own observation, but what would be altogether superfluous after the excellent article of Dr. Lidell, published in the number of this journal for October 1864. In the work before us in

the chapter on gunshot wounds of the abdomen, there is about one page occupied with injuries of the vertebræ, and no more is said on the subject in the whole work. The remaining portions of the nervous system are passed over without any mention whatever, although the late Surgeon General considered them of sufficient importance to assign a special hospital for their study.

The injuries of the bones, caused by balls, are those of all others whose final result has most grievously disappointed all our calculations. The effect of a slight touch upon one of the bones of the cranium from a glancing shot is seen in some cases related above. We have again and again seen a stout fellow sink when one of the long bones had been touched so slightly as merely to carry off a small piece of periosteum. When this happened in the femur death *always* followed. As a paper upon gunshot contusion of bone has been promised, as a contribution to this journal, by one more competent than we are to treat of it, we shall satisfy ourselves with this short reference to the subject. Should such cases again fall under our care, we shall proceed at once to trepan the bone at the seat of injury. Of such injuries no mention is made by Dr. Hamilton; and he is equally silent about osteo-myelitis, which is even more astonishing, for it is a subject to which particular attention has been called, and upon which a great deal has been written in late years. The paper recently published in this journal by Dr. Allen may here be cited as one of special value on this most distressing complication of gunshot wounds. When the stump of an amputated limb suffers from this affection, we have repeatedly verified the correctness of the advice recently given by Mr. Longmore, namely, that it is better to wait for the elimination of the portions of bone that are to die, than to amputate at the joint above. In one case where the left femur, or what was left of it, was thus affected, nearly two years elapsed before the stump had perfectly healed.

In cases of gunshot wounds where the bones are broken, either into the joint or not, whether of the upper or of the lower extremity, we have failed to see, as we had hoped to do, that resection may be substituted for amputation, as exposing life to less danger, or securing a more useful limb. If amputation be not performed, we are satisfied that the surgeon should simply remove loose splinters of bone, and also those but slightly adherent, and then apply an apparatus to keep the parts as quiet and in as good position as possible. Resections, as a class of operations, have failed in military surgery. There is a long chapter in the work before us entitled Exsections, but it is only calculated to give information to the student of operative surgery. The same remark applies almost equally well to the chapter headed "Amputations." It contains, it is true, some considerations upon the conditions of the limb in army practice demanding amputation, the point at which amputation is to be made, the method, and the period of time at which it ought to be made; but those considerations contain nothing new, and they have been far better treated by other writers. Let any one, for example, compare those upon the conditions of the limb that demand amputation, with the indications given by Stromeyer. Upon this subject, again, we are able to refer to an admirable paper by Dr. Lidell, published in the April number of this journal. By no other writer has the proper time for performing amputation been so satisfactorily discussed.

On the subject of gunshot wounds of arteries we are, once again, so fortunate as to have a paper of Dr. Lidell (see this journal for January, 1864) to refer to. Upon one point only we cannot agree with him, and that is

the expediency of abstaining from performing any operation upon a wounded artery for hemorrhage unless it bleed at the time. This is the course he prefers, for the reason given that it frequently happens, even in apparently unpromising cases, that a hemorrhage stopped spontaneously or by simple means does not return (*loc. cit.*, page 115). This is also, as we know, the advice given by Guthrie. We have too often been deceived, ourselves, in the hope of seeing the bleeding stop, to have confidence in this. Besides, as Legouest says, hemorrhage kills not only by loss of blood but also by the anguish and dread it excites. It is a most pitiable sight to see men awaiting in fear an accident whose gravity they know instinctively. Dr. Lidell says that "to ligate the artery in such a case would be to inflict unnecessary torture upon the sufferer." In this we think him to be mistaken. We have always seen the man under these circumstances most desirous of undergoing the operation, and highly gratified when it had been accomplished. As to the torture of the operation itself, the use of an anæsthetic puts this out of the question.

We here finish our brief and somewhat hasty remarks on some of the most prominent points in the surgery of war, in which the whole profession in this country has, for several years, been deeply interested. What we have seen and done ourselves, it should be stated, was in a hospital in this city, and not in the field, not at City Point, nor at Washington. In other words, it was for the most part only the remote waves of the distant storm that we saw, and from which we made our observations.

We have already, from several references to the book before us, by Dr. Hamilton, said enough to show that we have found it to be in several respects defective and incomplete. Some of those subjects, which are of the highest and most special importance to the army surgeon, are altogether omitted. In addition to some already mentioned may be cited nostalgia, sunstroke, congelations, and even pyæmia.

As a general rule, original cases, for which we looked with some expectation, are, throughout the book, of such a character, from incompleteness, as to be quite valueless. Some examples of this were given when speaking of wounds of the head, and there are others equally remarkable elsewhere. Of what value, for example, are such cases as these, taken from the chapter on Gunshot Wounds of the Thorax.

"Isaac Etchell, a private in the 72d Penna., was wounded at Antietam, on the 17th of Sept., 1862, by a round ball, which entered the left side of the chest in front, three inches above and to the left of the nipple, passing completely through. He expectorated blood immediately and freely, but it soon ceased and never recurred. On the twenty-fourth day the wound had closed, and he was sitting up, but he continued to suffer from pain and a sense of oppression over the whole of the left side. Having never seen him since, we are unable to state the final result."

"Moses Haseltine, a private in the 12th Mass., was wounded at Antietam by a ball which entered the thorax two inches outside of the left nipple, and passed entirely through the body. He expectorated blood within ten minutes, and continued to do so for nine or ten days. Air had escaped through the wound in the back. Suppuration was free on the twenty-third day; he had considerable cough, and was looking thin and pale."

To be told that twenty or thirty days after being shot in the thorax a man suffered pain and had a sense of oppression, or had considerable cough, and was looking thin and pale, does not inform us even as to the then present condition of the parts in the thoracic cavity, which auscultation and percussion would have done. Still less does it throw any light

upon their final termination, and this in these cases requires elucidation. Although we have treated a large number, and had many under our care for many months, we feel ourselves as yet quite in the dark as to the final results in gunshot wounds of the thorax.

In concluding this review, it may not seem out of place to give expression to our feeling of deep regret that the able and highly intelligent surgeon, who had collected with indefatigable industry so many valuable materials for the surgical history of our war, and who had made great progress towards the completion of the work, has not had the privilege afforded him of finishing his task. Had this been done, the profession could look with greater confidence for a full account of what medicine has done in its bloody fields and crowded hospitals, sure that, so far as we are concerned, it should not be said of this dreadful war, *caruit vate sacro.* W. F. A.

ART. XVIII.—*Lectures on Epilepsy, Pain, Paralysis, and certain other Disorders of the Nervous System, delivered at the Royal College of Physicians in London.* By CHARLES BLAND RADCLIFFE, M. D., Fellow of the Royal College of Physicians in London, Physician to the Westminster Hospital, &c. London: John Churchill & Sons, 1864.

A PHYSICAL theory of innervation and muscular action must, if established, be a grand advance in physiology. If its application to pathology and therapeutics be direct, and, most of all, if it tend to cause a revolution in practice, such a theory must have great importance. Has Dr. Radcliffe furnished us, in the work entitled as above, with this desideratum? Not without some sympathetic enthusiasm for the inquiry, excited by his own manifest though intelligent zeal, we have endeavoured to do justice to this question, by a careful study of the work. If our conclusion be not such as to satisfy either its author or our readers, it will not be from want of attentive consideration of the argument.

Twelve years sooner, as Dr. Radcliffe states in his preface, he published an essay on the "Philosophy of Vital Motion;" and afterwards other volumes, in which he endeavoured to show that it was necessary to revise the current theory of muscular motion, and to consider muscular contraction as "a physical process in which the attractive force inherent in the physical constitution of the muscular molecules was the contractile agent;" and, in consequence, that a radical change was called for in the pathology and therapeutics of convulsion, tremor, and spasm. Since the last[1] of these works was printed, he has found occasion to add further evidence in favour of his doctrine, and to extend its application to the physiology of sensation, and the therapeutics of pain and paralysis.

In the essential idea upon which he starts in all of these investigations, others had anticipated him to some extent. Dr. West, of Alford, as mentioned in Dr. Radcliffe's appendix, maintained distinctly, in 1832, that "the nervous influence present in relaxed muscular fibre is the only influence which the nerves of volition possess over that tissue; that its office is to restrain or control the tendency to contract which is inherent in the muscle:

[1] Epileptic and other Convulsive Affections of the Nervous System, and their Treatment. Incorporating the Gulstonian Lectures for 1860.

and that contraction can only take place when by an act of the will this influence is suspended, the muscle being then left to act according to its own innate properties." A little later, Sir Charles Bell is said to have *hinted* at a similar idea in one of his lectures, although premising an expectation that "the question could never be settled." Dugés of Montpellier, Matteucci, Engel of Vienna, and Stannius of Rostock, are also quoted as advocating more fully a hypothesis of the same kind.

Our author's clear language may be best used to indicate what the facts and arguments of his lectures are designed to antagonize.

"With respect to muscular action, the current doctrine is, that muscle is endowed with a vital property of contractility; that muscular contraction is the sign of vital excitement in this property; that excessive muscular contraction, whether voluntary or involuntary, betokens excessive vital excitement in this property, and that the treatment required in order to subdue convulsion, or any disorder analogous to convulsion, is one which is calculated to quiet excessive vital excitement. What I hope to do is, to show that the facts, old and new, but particularly those which have been brought to light during the last fifteen or twenty years, necessitate a very different doctrine, and a not less different practice. With respect to sensation, the current doctrine is, that certain kinds of nerve-tissue are endowed with a vital property of sensibility, that sensation is the sign of vital excitement in this property, that pain, or any sensation analogous to pain denotes excessive vital excitement, and that the treatment of pain and sensations analogous to pain must be ruled according to this view, the proper means being those which are calculated to subdue vital excitement. What I hope to do is to show that the change in doctrine and practice which is demanded in the case of disordered muscular action is also demanded in the case of disordered sensation." (pp. 2, 3.)

First, then, the physiology of muscular motion is considered. Regarding animal electricity as essentially connected with this, our author gives a preliminary sketch of the successive discoveries of Galvani, Volta, Humboldt, Aldini, Nobili, Matteucci, and Dubois-Reymond upon that subject; whose importance is indicated by words cited from Humboldt, "La physiologie doit à Galvani et à Harvey ses deux bases principales." The joint labours of Matteucci and Dubois-Reymond have left no room for entertaining any doubt as to the reality of animal electricity. Matteucci has demonstrated its power to decompose iodide of potassium, and to affect the condenser and galvanometer, and has shown that muscular contraction is accompanied by an electrical discharge, analogous to that of the torpedo. Dubois-Reymond's discoveries go far into detail in regard to the electrical currents in nerve and muscle in different kinds of animals.

Dr. Radcliffe's first proposition is one of those established by the observations of the last named investigator; that "during inaction the natural state of living muscle and nerve is one in which the longitudinal and transverse surfaces of the fibres are in a state of electrical antagonism, the longitudinal surfaces being electrified positively, and the transverse surfaces negatively." In an electrical point of view, there is stated to be no difference whatever between nerve and muscular fibre, or between different kinds of muscular fibre, or of nerve fibre.

To explain this electrical antagonism between the surfaces, Dubois-Reymond proposes one hypothesis, and our author another, as to the molecular arrangement and polarity of muscle and nerve; the same for both. These different views cannot well be made intelligible without the diagrams given in Dr. Radcliffe's book. Why the molecules, or fibres composed of them, should preserve their particular electrical arrangement, is a problem yet unsolved.

Further, under certain circumstances the electrical relations between the longitudinal and transverse surfaces of muscle or nerve may be *reversed;* the longitudinal becoming negative, the transverse positive. This may happen just before rigor mortis in some animals, in the muscles; and in nerves after various injuries. In an isolated limb of a frog, contact of a hot iron with the nerve will cause it. Dr. Radcliffe asserts that—

"The vital properties of the nerve are not materially affected so long as the reversal lasts; the muscles of the leg may very readily be thrown into a state of contraction by acting upon the nerve, while the needle of the galvanometer shows very plainly that the natural electrical relations of the longitudinal and transverse surfaces are reversed." (p. 26.)

Very distinct statement and illustration follow of other propositions. We have space for some of them only. During the state of inaction living animal tissues furnish signs of natural electricity of high tension. One of the most remarkable experiments upon this point is that of Humboldt; in which the spontaneous animal electricity (as he regarded it) was made to traverse a gap between the ends of a divided nerve to the extent of four-fifths of a line. Muscles *lose* their "natural electricity" in *rigor mortis*, at the same time that they lose their irritability.

Contrary to views elsewhere previously expressed by him, Dr. Radcliffe now believes that the primary electrical condition of living muscle and nerve during inaction, is that of statical electricity; the "muscular current" and "nerve current" being only secondary phenomena. Dubois-Reymond, however, thinks that strong currents circulate in closed circuits around each one of his peripolar molecules.

Now it appears to us, however abrupt the statement of this opinion may appear just here, that these decided differences, upon such a point, show how *purely hypothetical* very much of the foundation of this "theory of nerve and muscular action" is. The language of Dr. Radcliffe's next two propositions confirms this view. "It is possible," he says, that the elongated state of the fibres of living muscle may be due to the presence of the electricity which is inherent in them during the state of inaction. "It is possible" that the state of the muscular fibre in rigor mortis may be the necessary consequence of the extinction of the natural electricity of the fibre. Were these possibilities, and others consequent upon them, made certain, a physiological law would be founded, instead of a plausible conjecture.

Action in motor nerve and muscle are, in our author's second lecture, similarly studied. "The state of action in a muscle is accompanied by a discharge of electricity analogous to that of a torpedo." This is the starting proposition. Matteucci devised the experiment which proves it. A frog's leg, skinned, with all parts of the thigh cut away except the principal nerve, has this nerve laid upon the muscles of another leg prepared in exactly the same manner. When the nerve of the *latter* is pinched, "induced contractions" take place in the muscles of the former. Of course the force causing these secondary contractions has been communicated from the muscles of the limb acted upon. That it is *electrical* force is shown, further, by interposing small pieces of moistened lamp-cotton between the nerve of the one limb and the muscles of the other; when the same result will occur as before. That it is "analogous to the discharge of the torpedo" is inferred "from sundry obvious analogies between the anatomy and physiology of the muscular system and the anatomy and physiology of the electric system." (p. 42.)

Those analogies are close, undoubtedly. But, as Dr. Radcliffe afterwards founds a good deal upon this proposition, let us scrutinize it a little. What is proved should be carefully separated, in such an inquiry, from what is merely possible; a mere analogy, from identity. Observe, then, how *artificial* all the circumstances are under which the experiment is performed. Brevity requires us simply to ask, is *every* muscular action, in a living animal, accompanied by a "discharge analogous to that of the torpedo?" Can it be so, when we know that, although nerves and muscles lie packed together in all the limbs and other parts of the body, a few fibres, or the largest muscle, may act *alone*, with no "induced contractions" at all? May not the result described be merely pathological (traumatic); like so many of the complicated results of vivisection?

Further; in another part of the volume, this experiment and conclusion are made important parts of an argument to show that the relation between muscle (as well as nerve) in action, and electricity, is, a *loss* of electricity as the *cause* of the action; the natural electricity of the muscle maintaining its *dilatation*. Yet, in the experiment above, and in the corresponding one next mentioned in the book, where the nerve of one limb touches the nerve instead of the muscle of the other, the electricity discharged by the one limb is *received* by the other; and produces in it *not dilatation*, but *contraction;* the only *proof* of the "discharge" being the contraction so induced. Is not this enough to show that no very essential inference should, as yet, be drawn from this experiment?

Next, we have (p. 45) the proposition, most important, perhaps, of all, that "the natural electricity present in living muscle during the state of inaction is almost or altogether absent in the state of action." The same statement, precisely, is made in regard to the inaction and action of motor nerve; founded, in both cases, on galvanometric experiments.

"M. Dubois-Reymond does not speak of this disappearance of electricity from the muscle, during the state of action, as a *discharge*. Indeed, he has his thoughts fully occupied with the idea of current electricity, and he ignores altogether the evidence of discharge which has been supplied by M. Matteucci. As it seems to me, however, M. Dubois-Reymond supplies the very proof which M. Matteucci requires to supplement his discovery; for in the case in which M. Matteucci infers the existence of electrial *discharge*, M. Dubois-Reymond shows that there is an actual *disappearance* of electricity." (p. 47.)

We have looked through the volume to find some allusion, in connection with this "disappearance of electricity" (which is said also (p. 124) to attend voluntary muscular action), to the theory of the transmutation of electrical into mechanical contractile force, so familiar to many physiologists since the publication of Grove's inquiries. It is found on page 132 of Dr. Radcliffe's book; and is by him very briefly disposed of as a "notion," which seems to him not in harmony with the history of *rigor mortis;* as, to his view, "the explanation, which will apply to ordinary muscular contraction, as well as to rigor mortis, is surely to be preferred to that explanation, which, at best, can only apply to ordinary muscular contraction." To this, we must say, "*non sequitur*." It involves an assumption, open to very great doubt, that rigor mortis and common contraction of living muscle are phenomena of one category, with one explanation. Nor is it at all impossible to account, hypothetically, for rigor mortis, in consistency at least with the theory of "conversion of force." The neglect of this theory, indeed, appears to us the weakest point in Dr. Radcliffe's book.

It would be improper to detain the reader with the minutiæ of the argu-

ment, as very clearly given by our author. His style is certainly a model of lucidity and precision. It would be injustice to attempt to condense his matter into less compass than that of his own pages, since that could only be accomplished by omission of important points. Mere reference to the most prominent difficulties presented must suffice us.

After establishing that "a motor nerve which has lost its natural electricity has also lost its irritability," some very curious effects are shown, as connected with the inclusion of a nerve between the poles of a galvanic circuit, according to the relative position of the positive and negative poles. Using for a time the common terms of "direct and inverse," or "centrifugal and centripetal currents," he afterwards speaks, in a manner less easily reconciled with prevalent views of electrodynamics, of "the action of *each pole, singly,* upon the nerve." We must confess to an inability to find either necessity or advantage in this employment of terms, over that of those which ascribe stimulation and paralysis, respectively, of a nerve, under the circumstances mentioned, to *current* action, either with or adverse to the polarity of the nerve-trunk itself. Either set of expressions is obviously consistent with the conclusion given (p. 75), that all these results "appear to be the natural consequences of the reaction which must take place between the artificial electricity on the one hand and the natural electricity on the other."

The influence of the blood upon the activity of muscles, nerve-centres, and nerves is the first topic entered upon in Dr. Radcliffe's third lecture. It is said, and proved by experiments by Brown-Séquard and Stannius, not only that rigor mortis is associated with stagnation and coagulation of the blood, but that muscles which have passed into the state of rigor mortis will return into the state of vital relaxation if their muscles be supplied with a sufficient amount of blood. The experiments, fully described, are decisive.

Next he asserts that "increased disposition to ordinary muscular contraction appears to be associated with diminished supply of blood to the muscular system." (p. 84.) All the facts mentioned on this point are such as show greater "irritability" of the muscles in animals (reptiles and fishes) whose blood is least arterialized, and in hybernating mammals than in the same at other times, and in a warm-blooded animal whose circulation was depressed to the reptilian standard by division of the cervical portion of the spinal cord. Two propositions follow which are generally admitted, that "general convulsion is brought about by sudden hemorrhage," and also "by suddenly arresting the arterialization of the blood," as by suffocation.

Harley's experiments are adduced to show further that air left in contact with blood to which strychnia or brucia has been added contains more oxygen and less carbonic acid than air left in contact with simple blood. Our author infers that "one way in which strychnia or brucia brings about spasmodic muscular contraction is by producing a change in the blood which is equivalent to loss of arterial blood." (p. 87.) He concludes also, very reasonably, we consider, that the influence of venous blood in the process of muscular motion is "equivalent to the absence of arterial blood" solely, instead of the carbonic acid contained in it being, as Dr. Brown-Séquard has urged, a direct stimulus to muscular action.

In some pages which follow, an almost sophistical confounding occurs, it seems to us, of *convulsive* action with "ordinary muscular contraction." No experiments illustrating to any considerable extent the process of normal voluntary motion are described; but whatever is shown to be true of rigor

mortis, or convulsive or spasmodic (all, of course, morbid or pathological) muscular action, is taken for granted to be as true of all "ordinary muscular action." This should *not* be granted without proof; it does not have *a priori* probability. As to convulsion, spasm, and tremor, there need be no hesitation in admitting that "in the most exaggerated form" they may and do occur when "the amount of nervous influence supplied by the nervous centres to the muscles must be at or near zero." All the pathological conclusions of our author may be accepted and regarded of importance, without involving the sweeping physiological generalizations his terms require. Can voluntary muscular activity go on when nervous influence is at zero? or when the muscles are deprived of arterial blood? Our author's words sometimes negative these questions; as when he says that "a muscle left to itself is in a state of dilatation," and that "the functional activity of any organ is in proportion to its supply of arterial blood." We have, too, an experiment narrated (p. 98) in which there is "paralysis in the parts from which the blood is excluded, paralysis almost everywhere, convulsion nowhere."

It is needful for us to pass over many interesting pages, whose topics are so intricate that one must give them careful study to apprehend their bearing. The *controlling* influence of the brain, and probably medulla oblongata, in preventing morbid excito-motor disturbance under peripheral nervous irritation, is somewhat under-stated, although mentioned.

The "physical theory of muscular action" adopted by Dr. Radcliffe is expressed summarily as follows (p. 110):—

> "When a muscle is made to contract by means of its nerve, there is reason to believe that the electrical discharge (analogous to the torpedo) which accompanies nervous action has reversed the electrical relations of the exterior and interior of the muscular fibres in the part acted upon; that this reversal has led to the discharge of the electricity which is present in the muscular fibres during the time of rest, and which keeps these fibres in a state of relaxation so long as it is present; and that this discharge of electricity brings about muscular contraction by leaving the muscle free to yield to the action of the attractive force which is inherent in the physical constitution of the muscular molecules."

On this we must remark, further, that our author has proved (p. 26) that while the needle of the galvanometer shows that the natural electrical relations of the longitudinal and transverse surfaces of a nerve are reversed, the muscles of the limb experimented upon may be "thrown into a state of contraction by acting upon the nerve." That is, the reversal being for the time persistent, contraction may be otherwise produced and intermitted; of course, therefore, the one cannot depend upon the other.

Moreover, no explanation of the *source* of the electricity natural to muscle as well as nerve is given with this theory; the cause of the polarity or statical repulsion of the molecules in dilated muscle is not suggested. We have, then, for those molecules, two sorts of attributes assumed: 1st, an *electrical repulsion*, owing to the arrangement of the particles, they being alternately positive and negative; 2d, a *tendency to attract each other*, owing to their *physical constitution*. Is not this less simple, after all, and less satisfactory, than the supposition that dilatation of muscular fibre is owing to the elasticity which it has in common with several other tissues, and that contraction is due to attractive force developed in the molecules in the direction of the length of the fibre, whether it be by the conversion of electrical into mechanically contractile force or not? We are not wedded to this theory, but simply fail to find demonstrative reason for

preferring the one above proposed instead of it. Dr. Radcliffe remarks himself that one objection to it is that *nerves* ought to contract in their length, as well as muscles, under the same reversal of the electrical relations of their surfaces which is observed to occur. Unable to obtain any instance of nerves so contracting, he is obliged to be contented with supposing it *possible* during life, and with the conjecture that the beaded appearance of nerves after death is of that nature. This does not seem to us to solve the objection.

Nor can we find that an actual advance is made by our author's reasoning upon the subject of rhythmical muscular motion, whose alternations he makes to depend on electrical reversals in ganglia, whose condition is again affected by the injection of arterial blood, and its becoming venous, successively. As a hypothesis it may do, but no better than other hypotheses.

It is certainly claiming too much to assert that such views explain "capillary force." While Dr. Radcliffe is no doubt right in considering that a force resides in the vessels (arteries) contributing to the circulation, this yet leaves over a force of a different nature, acting in the capillary region, analogous to that moving the sap in plants.

Much more might be said upon the very similar views set forth on the physiology of sensation. But, as the facts and arguments are parallel, nearly the same remarks would apply.

It is satisfactory to be able to speak with more unqualified approbation of most of the pathological discussions and conclusions of our author.

Of epileptic, epileptiform, and hysterical conclusions it is, on the basis of facts, asserted that they are "connected with depressed and not with exalted vitality." The signs of this condition are derived from the respiration and circulation, both during and between the paroxysms.

One incidental proposition admits of question (p. 184) :—

> "At the height of the epileptic or epileptiform paroxysm the pulse is usually full, strong, and frequent, because the arteries are then labouring under a load of *black* blood, as they are found to labour in suffocation, and not because these vessels are then receiving an increased supply of *red* blood."

We must doubt the dependence of the character of the pulse in this case, or in suffocation, upon *either* the venous or the arterial condition of the blood. Experiments of Dr. J. Reid, of Aberdeen, and Prof. Draper, the younger, of New York, are referred to as to the state of things in suffocation. The pulse was found, by the hæmadynamometer, to increase greatly after the windpipe had been tied. The *apnœal* pulse, therefore, Dr. Radcliffe infers, is the *pulse of black blood.* But Dr. Draper found blood accumulating, during suffocation, in the aorta. Might not obstruction, *resistance,* increase the hæmadynamometric pressure to the degree observed?

It is correctly stated that convulsion never coincides with a state of active febrile excitement. Dr. Radcliffe also avers that there is no clinical evidence to show that, in convulsion, there is an over-active circulation in the brain. Nor are *post-mortem* appearances thought to conflict with this view. Schröder Van Der Kolk's observations of the large dilatation, with thickening of the walls of the bloodvessels of the medulla oblongata in epileptics is the most open to different interpretation upon this point. Congestion of the cerebral veins has, likewise, been shown not to be associated in causation with convulsions.

Therapeutical deductions of great interest are drawn from these facts; and it is on account of these especially that attention was called to Dr. Radcliffe's previous volume upon the same subject. He argues, with con-

siderable force, backing his reasoning with clinical facts, against purging and low diet in epilepsy, and in favour of cod-liver oil, phosphorus, and fatty food; in commendation, too, of regulated gymnastic exercises; against belladonna and zinc, and for bromide of potassium, and alcoholic regimen. Sir Charles Locock is lauded for the introduction of the bromide of potassium in the treatment of epilepsy, as opening at once "a brighter future for the fortunes of epileptics." While experiments upon animals, and some clinical observations, give reason to ascribe to it narcotic and anæsthetic properties, the exact rationale of its action in epilepsy is not determined.

Phosphorus Dr. Radcliffe has used in the form of a mixture of the ethereal tincture of phosphorus of the French Codex, mixed (f℥j in f℥ij) with sulphuric ether; his dose of this preparation being half a fluidrachm or a drachm mixed with water.

Against belladonna he urges that its causing dilatation of the pupil is a contra-indication in epilepsy. This dilatation, he considers, "there is reason to believe," results from the belladonna producing an *anæmic* condition of the brain; the size of the iris depending, when in a state of rest, in great measure upon the fulness or emptiness of its bloodvessels. In epilepsy, therefore, where our author's theory requires the supposition of an anæmic tendency in the cerebral circulation, this action would be undesirable. Without having anything at all to urge in favour of the use of belladonna in epilepsy, and, at the same time, without being able to disprove this explanation, we must consider it very doubtful.

Less than a page, in this work, is given to the topic of the use of alcohol in convulsive affections. This is positively favourable, however. These are his words: "There is reason to believe that alcoholic stimulants are very trustworthy antispasmodics in the prevention and treatment of convulsion." (p. 249.) In accepting the truth of this as a therapeutical propositon, great judgment must be called for in its application. Few modes of practice could do more harm if indiscreetly carried out. It is impossible to doubt, nevertheless, that facts abound to show that it contains a valuable and often practically applicable truth.

The general statement which is the most important result of all of Dr. Radcliffe's inquiries, and which may well stand, whatever may be thought of his purely physiological views, is thus expressed: "There is reason to believe that the therapeutics of convulsion must be based upon the notion that vital power has to be reinforced, and not upon the contrary notion."

The last two lectures are occupied with the subjects of tremor, spasm, pain, and paralysis. Similar pathological facts, in regard to tremor and spasm, to those already reviewed as to convulsions, justify the same conclusions upon their therapeutics. The indication is in both to exalt, not depress "vital tone." The absurdity of imagining that promiscuous stimulation can accomplish this is, of course, put aside by the familiar history of delirium tremens.

Pain is described by Dr. Radcliffe as being "either of a neuralgic character, or depending upon tenderness;" the latter being only accidental, the former essential. Inflammation, he considers to produce pain "accidentally," by pressure of the swelling upon tender parts. Such a line of distinction, as our author observes, must be broken in some parts. Is it not too often broken to be descriptive at all? Which category will receive the pain of cancer; of chronic rheumatism; of the pains designated by Inman as *myalgia*? Here, again, we are most satisfied with Dr. Radcliffe's clinical and pathological generalizations. Neuralgic pain, is, as

he states, apt to be associated with a deeply depressed condition of the circulation; and to be antagonized by hyperæmic excitement. Sydenham and Garrod are quoted as giving data for the extension of this account to the severe pain of gout; and facts are given of the same purport in regard to other forms of pain apparently connected with an inflamed condition of the part.

Besides confirming theoretically some common therapeutical experience, our author infers further that "the diet best suited for the neuralgic habit of body appears to be one which does not contain too much lean meat and too little fatty and oily matter." (p. 311.) This follows from the physiological doctrine that oleaginous material abounds in all nerve-cells as an essential constituent. Dr. Radcliffe thinks that he has found practical exemplification of its truth. He also believes sugar in excess to be harmful to the neuralgic, by producing an excess of lactic acid in the blood. The properly regulated use of alcoholic drinks is recommended as an essential part of the preventive and curative treatment of neuralgic pain. (pp. 313–14.)

"I have no hesitation in saying that the proper use of alcoholic stimulants is at once the natural corrective of the neuralgic habit and the most trustworthy of all anodynes. I have repeatedly known a paroxysm of neuralgia prevented and cut short by a glass of hot grog, and the condition of the patient in other respects improved rather than damaged by the proceeding; and this is more than I could say of any other method of treatment; and I have too often seen the beneficial influence of rum and milk in the morning in correcting the neuralgic habit to have any room left for doubt upon this score."

Again, we say, this is a well-sustained principle of practice, but especially capable of abuse. There are some patients, at least to whom "rum and milk in the morning" would be more dangerous, though less distressing, than neuralgia. As to the decided preference expressed for coffee over tea as a daily beverage for the neuralgic, we cannot but indulge a good deal of doubt as to its justification.

Dr. Radcliffe's views in regard to the electrical condition of the system lead him to believe that it may be necessary to return to the original mode of using electricity as a therapeutical agent: for instance, by insulating the patient and charging him with positive electricity. As yet, his experience does not suffice to afford confident support to this opinion. A suggestion is further made that the induction-coil might be very beneficial in neuralgia, "provided only the operation be carried on long enough to bring about vascular reaction, long enough to bring on an artificial hot stage by paralyzing to a certain extent the vaso-motor nerves." (p. 321.) This must be looked upon as heroic practice; not without danger can it be to induce a "paralytic" condition other than the most transient anæsthesia, anywhere in the body. Dr. Radcliffe mentions having seen three cases which seem to give countenance to his notion.

In the pages devoted to paralysis, the most interesting point perhaps is the discussion of the significance of "early and late rigidity." In place of Dr. Todd's opinion that late rigidity is due to the shrinking of cicatrization producing a slow and lingering "irritation," Dr. Radcliffe considers it to be a sounder explanation that "late rigidity is the anticipation in the part of rigor mortis—*rigor mortis in vitâ*, and nothing less nor more." This view is plausible.

The use of electricity in paralysis is spoken of in terms similar to those already cited in reference to neuralgia. Here too the employment of "shocks of the coil-machine until the operation is followed by a sufficient

degree of vascular reaction" is recommended, with the intention of affecting the vaso-motor nerves of the centres involved. There is evidently reason to fear that such a course would be over-violent, rather promoting disorganization than nutrition.

Altogether, both to the physiologist and the physician, Dr. Radcliffe's book is one of great interest. In its practical facts especially it deserves careful attention; and in the whole discussion of the subject—often intricate—he has shown powers of analysis and elucidation, such as are rarely met with amongst medical writers. When unable to agree fully with him, every reader must concede that he has at least made it possible always to understand his statements and arguments; and thus, yet more advanced conclusions, in an important inquiry, are made more probable in the future.

H. H.

ART. XIX.—*Acupressure; a new Method of Arresting Surgical Hemorrhage, and of Accelerating the Healing of Wounds.* By JAMES Y. SIMPSON, M. D., F. R. S. E., Professor of Medicine in the University of Edinburgh, and Physician Accoucheur to the Queen for Scotland, &c. &c. &c. With illustrations. Demi-octavo, pp. 580. Edinburgh, 1864.

THE author of this work needs no formal introduction to the readers of this Journal. Everybody knows who Prof. James Y. Simpson is. His exalted position as an eloquent and erudite teacher, his obstetric and medical writings, his numerous contributions to the periodical press, his miscellaneous essays, and his discovery of chloroform as an anæsthetic agent, have secured for him a world-wide reputation, and made his name illustrious among men both in and out of the profession. His recent treatise on acupressure gives him fresh claims to the consideration, if not the gratitude of mankind. It affords additional proof, if any had been wanting, of the ever-active, restless, inquisitive state of a great mind, constantly in quest of new truths, and the development of new facts. It is not surprising that a man of such intellect and versatility, of such extraordinary mental gifts, as Prof. Simpson unquestionably possesses, should occasionally, like an erratic star, wander from his own more legitimate orb into the regions of another, to enrich it with new light. The case finds, singularly enough, its parallel in that of the great Paré, the illustrious inventor of the ligature, who, like the Scotch professor, was at once physician, surgeon, obstetrician, author, and reformer.

Acupressure, as a distinct hemostatic process, is a recent invention. The first account of it was communicated to the Royal Society of Edinburgh, at their meeting on the 19th of December, 1859. The paper was soon after published in the proceedings of that Society, as well as in the *Edinburgh Medical Journal*, the *London Medical Times*, and other prominent periodicals. The news of what professed to be so important an invention rapidly crossed the Atlantic, and attracted the attention of the great surgeons of this continent.

It is not our intention here to describe the operation of acupressure; to do so would evidently be out of place, as a sufficiently accurate account of it is to be found in every recent work on surgery; our chief business is with the treatise itself, and the actual progress of acupressure, as a hemostatic agent, and its probable ultimate fate.

The first thing that strikes one in perusing Dr. Simpson's treatise is its vast extent. We almost instinctively ask ourselves, How it is possible for a man to write so much upon so limited a subject? We feel as if we were floundering about in a vast sea, and yet it is impossible to read a dozen pages of the work without having one's attention completely absorbed in it. It possesses, in fact, all the charms of a romance. No one can read it without feeling that he is guided by the hand of a master. Its enchanting style, its varied learning, its earnest tone, impart to it a freshness and piquancy seldom equalled in medical writing. Its erudition is immense. Every writer of any note or consequence, from Hippocrates down to the present time, is laid under contribution. The author generally makes each tell his story in his own language, a mode of interrogation which adds greatly to the interest and value of the work. He constitutes himself, as it were, a judge at whose bar every surgeon, dead or living, has been compelled to deliver his testimony. The reader will find in this treatise more information upon the nature and treatment of wounds than in any other work extant. Had Prof. Simpson confined himself simply to acupressure, he might have exhausted the subject in one-tenth of the space; but it was impossible for a man of his mind to do this. Once fairly in the field, he found it of almost illimitable extent, and we may well imagine how reluctant he was, when, at length, he reached the last page of his book, to relinquish a task which must have afforded him so many pleasant hours of intercourse with scientific men.

The first practical application of acupressure was made soon after the announcement of the invention. Scotland supplied the first cases. They were principally cases of amputation of the leg and forearm. Very soon, however, the process was extended to the large vessels. Dr. Struthers, of Leith, was the first to apply it to the femoral artery in an amputation of the thigh. Up to the present moment, acupressure has perhaps been more frequently employed in Scotland than in any other part of Great Britain. Cases of it are occasionally reported in connection with the London and provincial hospitals, but they are comparatively few, and, from all that we can learn, the operation is not in special favour with English and Irish surgeons. On the continent of Europe—France, Italy, Germany, and Russia—acupressure is seldom performed as a means of arresting hemorrhage. A similar remark is applicable to our own country. The remedy, soon after its introduction among us, was seized upon with avidity by some of our leading surgeons. One gentleman, we know, applied it even in a case of amputation at the hip-joint, although not without misgivings as to its entire safety; for before he closed the wound he considered it his duty to resort to the ligature. We have not been able to learn that the operation has been much, if indeed, any, practised by our military surgeons who have enjoyed such unbounded opportunities of tying arteries during the present war. Our civilians generally give the preference to the ligature. One reason for this no doubt is that the ligature is so much more easily obtained than the acupressure needle, not to say anything of its much greater cheapness, although the latter consideration would probably not have much weight with any surgeon, however extensive his business. The author states, in his preface, that acupressure has been successfully applied in Asia and Australia. Dr. Davidson, of Antananarivo, Surgeon to the Royal Court of Madagascar, in a letter to a friend of Prof. Simpson, declares that he is so much pleased with this mode of arresting hemorrhage in amputation that he thinks he will never use ligatures again.

It is not a little surprising that the greatest opponent acupressure has yet met with, should be a colleague of the ingenious inventor himself. Prof. Syme has omitted no opportunity to disparage and even denounce it, and that not always in the most gentle phrase. These attacks have, as might have been supposed, provoked severe replies from Prof. Simpson, as may be seen in the London *Medical Times* and the *Lancet;* the communications are exceedingly pungent and well written, and marked by the raciness of style so peculiar to the author. It is hardly possible that Prof. Syme could fail to smart under them, and yet it is certainly his own fault if he is made to suffer. His conduct affords an apt illustration of the sentiment of Terence: "*Si mihi pergit quæ vult dicere, ea quæ non vult audiet.*" Steel is not the only substance that cuts. To assume, as seems to have been the case in the present instance, that nothing good can emanate from the brain of an obstetrician, was rather a bold conclusion, fraught with evil consequences. The surgical professor in the University of Edinburgh has never, it would seem, employed acupressure, and yet, according to our author, he has set himself up as its most uncompromising enemy. When, or how, this controversy may end, time alone can determine. It is much to be regretted that there should ever have been any occasion for it. Disputation too often distracts the profession, and curdles the milk of professional brotherhood.

The current of invention, of discovery, and improvement never runs smooth. There is always something to ruffle its surface; something to impede its progress, and, if possible, to divert it from its rightful channel. Persecution often advances a cause more rapidly than its own intrinsic merit. The blood of the martyrs was the seed of the church. The opposition received by Paré, in his attempt to introduce the ligature as a hemostatic agent, to the notice of the profession, forms one of the most thrillingly interesting, as well as one of the most humiliating, pages in the history of medicine. Mortification and chagrin met him at every step. His opponents soon assumed the character of unrelenting persecutors. No means were too foul for their purpose. Their efforts were unceasing. Paré had no rest by day or by night. Gourmelen, President of the College of Physicians of Paris, old, irritable, insolent, and conceited, would have burnt him at the stake, if he could have prevailed upon his sovereign to connive at so horrid a crime. Paré, through all this storm of opposition, stood firm at the helm; gradually, light burst in upon the profession, like the dim glimmer that meets the vision of the wearied traveller as he is about to emerge from a dense forest; and the seething iron, the boiling pitch, the hot turpentine, blue vitriol, and other means of torture were forced to yield to the silken cord. The victory was accomplished. God's purpose was fulfilled. "For the good of mankind," says Paré, "and the improvement and honour of surgery, I was inspired by God with this good thought." And a good thought it was, a thought which has saved more limbs and lives than any other improvement ever vouchsafed to surgery.

The spiteful, impudent manner in which Gourmelen denounced the innovation of the ligature may be gathered from the following extract from his work on surgery. Without deigning to mention Paré's name, he writes: "It was then very forward, rash, and presumptuous in a certain person to venture upon condemning the cauterizing of bleeding vessels—after cutting off a mortified limb—a method so highly and continually commended and approved of by all the ancients, teaching, in opposition to

that, without any authority, without knowledge, without experience, without good sense, some new method of his own, of tying arteries and veins." It is remarkable that the use of the ligature, as a means of arresting hemorrhage, was not generally accepted in Europe until near the middle of the last century.

The confidence of the author in the ultimate universal adoption of acupressure seems to be unbounded. Notwithstanding the opposition manifested to it in certain quarters, by men occupying high places, he declares, in a recent communication in the *Medical Times and Gazette*, that it has made greater progress, in obtaining professional favour, in four years than the ligature did in fifty. In the closing chapter of his work he boldly predicts that, although not a prophet, acupressure will, within the next two or three generations, completely supersede the use of the ligature as a means of arresting hemorrhage. Whether this is to be in its present or in some other modified form, he does not state. The ligature, at all events, is a doomed *institution* in the opinion of Professor Simpson; for, says he, if this revolution is not effected by acupressure, it may be by some other hemostatic means even still more safe and simple. "It is mere idleness and frivolity," he adds, "to argue, as has been lately and earnestly done, that no efforts should be made in this direction, because surgeons are generally quite content with the ligature, in despite of its evils, and have no wish to change." We sincerely wish we could share this belief of the distinguished author, amounting as it does, in his case, to a conviction; but we fear that his prediction will never be verified. That acupressure will gradually establish itself in the confidence of the profession as an important auxiliary in the treatment of surgical hemorrhage, is what we fully believe; but it would be unreasonable to suppose that it will ever entirely supersede the use of the present method—that good thought for which Ambrose Paré so devoutly thanked God for having inspired him with. There are many regions of the body where, owing to the peculiar relations of the vessels to the surrounding parts, acupressure cannot be employed with advantage. In wounds of the neck, for example, a patient would hardly be comfortable or safe with acupressure needles sticking, like so many arrows, in his flesh. It would not be easy to secure the subclavian artery with such a contrivance. Hemorrhage of the ophthalmic artery, deep in the orbit of the eye, could not be safely controlled by acupressure.

Professor Simpson has evidently, we think, overrated the injurious effects of the ligature. He asserts that every thread, however delicate, thrown round an artery, acts as a seton, provoking irritation and discharge. To some extent this is unquestionably true. That portion of the artery included by the ligature always perishes, and must therefore be thrown off as a slough. In general, however, the irritation thus induced is comparatively slight, and hardly, if at all, interferes with the reparative process. It is only, or chiefly, when the parts have been seriously bruised, concussed, or otherwise injured, that the ligature is likely to cause serious mischief, and then even an acupressure-needle would hardly fail also to act as a seton. Severe shock and loss of blood always powerfully predispose to the production of pyæmia, an occurrence for which, in the opinion of our author, the ligature is often more to be blamed than anything else. The needle used in effecting apposition in hare-lip not unfrequently excites free ulceration, even when there is comparatively little tension, clearly showing that a metallic substance is by no means as innocuous as some of its advocates would lead us to infer.

When numerous ligatures are used, it is easy to perceive that they must more or less seriously interfere with the adhesive process; and, in such an event, there must also, of necessity, be much greater risk of erysipelas and pyæmia. It is not often, however, that this is required; in general, a few ligatures only are needed in any wound, however extensive. We may remark, in passing, that there is still too much disposition on the part of operators, even of the greatest intelligence and respectability, to employ unduly large ligatures, apparently unaware of the mischief which such a practice is almost always sure to produce.

The horrors of the ligature are thus depicted by our author:—

"Nothing," says he, "in the whole round of professional practices and customs, seems to me to be a more curious anomaly and paradox than to watch surgeons sew up with the greatest artistic exactitude and nicety the lips of an amputation or other wound with metallic sutures, while they have waywardly and designedly left, buried in the interior of the wound, a series of silken ligatures, each of which will inevitably produce ulceration and sloughing at the ligatured points. The finished wound is apparently all tidiness and neatness without; but within there are minute strangulated sloughy portions of festering tissue, the sphacelation of which must inevitably be attended by ulceration and suppuration. It is like enforcing cleanliness, as it were, and the best hygienic measures outside a house, whilst within doors there are retained and locked up filth and decomposition, and explosive elements of destruction and disease. It is, in short, the old story of the 'whited sepulchre,' 'beautiful outwardly,' but within 'full of uncleanliness.'"

The advantages of acupressure over the ligature are thus summed up: 1. It requires no isolation of the artery. 2. It causes no direct mechanical injury, contusion or laceration of the two internal tunics; nor any strangulation, ulceration or mortification of the external one. 3. It does not lead to suppuration in the wound. 4. The needles used in it do not imbibe any animal fluids. 5. It excites inflammation only up to the stage of adhesion. 6. It generally occludes both artery and vein; is removable within a few hours, or, at most, a few days, at the will of the operator; requires only one person to perform it; and is seldom followed by secondary hemorrhage. 7. It places the wound locally in far healthier hygienic conditions. 8. It is much less likely to occasion erysipelas and pyæmia. 9. It makes complete primary union more frequent, and healing quicker.

We omit the consideration of a number of highly interesting topics discussed in these pages. The reader will find in them a more full and accurate account of metallic ligatures, sutures, and kindred appliances than in any other work extant. Nothing seems to have escaped the eye of the learned author.

We rise from the perusal of the treatise before us with increased respect and admiration for Professor Simpson. Whatever may be the ultimate fate of acupressure, whether it shall be universally adopted by the profession as a substitute for the ligature, or whether it be partially or completely rejected as a useless innovation, it is impossible to award too much praise to a man who has been at such pains to place the subject in so clear and tangible a light before the public. We hope that he may be spared to witness surgery, as a practical science, honourably advanced by his own labours; for, to borrow his own language, its march must ever be forwards; it can acknowledge no boundaries to its development, and knows of no finality. The work is beautifully printed, and the illustrations, forty-two in number, are, in general, well executed. S. D. G.

ART. XX.—*Osmosis: the Forces by which it is accomplished, and its Agency in various Physiological and Pathological Processes, and in the Action of Medicines and Poisons.*

1. *De l'Endosmose des Acides.* Par M. DUTROCHET, Membre d'Académie des Sciences. Mémoire lu à l'Académie des Sciences le 19 Octobre, 1835.
2. *Endosmosis.* By H. DUTROCHET, M. D. In Encyclopædia of Anatomy and Physiology, by R. B. TODD, M. D. London, 1837.
3. *Lectures on the Physical Phenomena of Living Beings.* By CARLO MATTEUCCI, Professor of the University of Pisa. Translated under the Superintendence of Jonathan Pereira, M. D., Vice-President of the Royal Medical and Chirurgical Society. Philadelphia, 1848. Reprint.
4. *Researches on the Chemistry of Food, and the Motion of the Juices in the Animal Body.* By JUSTUS LIEBIG, M. D., Professor of Chemistry in the University of Giessen. Edited by Wm. Gregory, M. D., Professor of Chemistry in the University of Edinburgh, and Eben N. Horsford, A. M., Rumford Professor in the University of Cambridge. Lowell, 1848.
5. *Report on the Laws according to which the Mixing of Fluids and their Penetration into Permeable Substances occur, with special reference to the Processes in the Human and Animal Organism.* By JULIUS VOGEL. Chemical Reports and Memoirs of the Cavendish Society. London, 1848.
6. *On Phial Diffusion.* By Prof. GRAHAM. Philosophical Transactions. London, 1850.
7. *Liquid Diffusion applied to Analysis.* By THOMAS GRAHAM, F. R. S., Master of the Mint. Philosophical Transactions, Vol. 151, for 1861.
8. *Elements of Inorganic Chemistry.* By THOMAS GRAHAM, F. R. S. L. and E. Edited by Henry Watts, B. A., F. C. S., and Robert Bridges, M. D. Second American edition. 1858. Chapter "Osmose."

SINCE the experiments of Dutrochet on the subject, Osmosis has attracted much attention on the part not only of physicists, as a portion of natural science, but of physiologists, pathologists, and practitioners, who have sought aid from it in accounting for the molecular movements of the body, and in explaining the *modus operandi* of medicines. Although Dutrochet, of late years, has the merit of placing the two phases of osmosis, under the names of endosmosis and exosmosis, prominently before the scientific public, he cannot be considered as having been the first experimenter with regard to it. In the *Histoire de l'Académie des Sciences*, 1748, the Abbé Nollet directed attention to the passage of liquids of different composition through the membrane which separated them. The subject at this time occupies a more important position than formerly, because it is now known that a greater number of forces enter into the operation than was originally supposed. In treating of this subject at present, it is with the intention of bringing to bear upon medicine the assistance that has been furnished by the eminent investigators whose results have so largely contributed to our

knowledge, and of presenting as clearly as possible the *rationale* of the process of absorption in the living body.

It is stated by Matteucci that "there is no fact which demonstrates the existence of free extremities in the ramifications of bloodvessels, which everywhere present a very close and continuous reticulated structure. The arterial network is uninterruptedly continuous with the venous network, which in general preponderates over the former. The lymphatic system, likewise, never terminates by independent extremities, but everywhere presents the aspect of a very fine and close trellis-work. Anatomy, which agrees with physiology, leads us to the conclusion that the first part of absorption can be effected only by the aid of the porosities proper to the structure of organized bodies. In this way the absorbed matters arrive at and are mixed with the blood, the chyle, and the lymph, and are carried away by these liquids, and distributed over the body." The above quotation is the embodiment of the doctrine now entertained by physiologists, and as there are no defined perforations or mouths to the vessels admitted by them to exist, it is necessary to have recourse, for the purpose of explanation, to the property found in connection with all porous substances, viz., that of physical imbibition, which has been termed, when presented in organic tissues, by Dutrochet, *endosmosis* or *endosmotic* action. The reverse of this, or exudation, has been called *exosmosis*. As the phenomena of both of them are dependent on the same forces, as will be shown hereafter, it has been proposed by Prof. Graham to adopt the term *osmosis*, which is from the Greek word ὠσμος, impulsion, and which includes both series of phenomena.

It may be remarked that Magendie and Foderé rejected the idea of absorption by any other mode than by imbibition. The latter, in his researches upon exhalation and absorption, calls the first transudation, and the latter imbibition, which his experiments prove.[1] The idea of exhalant vessels in connection with that of open absorbent vessels has been abandoned. Porosity is a characteristic of living as well as of inanimate matter, and, as remarked by Matteucci, it will be readily admitted that capillary actions must exercise a great influence over the functions of the tissues of animals and vegetables, when we reflect that the interstices and the capillary tubes of the tissues have a diameter of from $\frac{1}{100}$ to $\frac{2}{100}$ of a millimetre (from $\frac{1}{1540}$ to $\frac{1}{5080}$ of an inch).[2]

It must be understood that capillary action is not the sole cause of absorption in living tissues, but that it conduces to it by affording the means by which fluids can enter through the interstices of the tissues. The animal membranes must be sufficiently porous to be moistened, or suck into their interstices by capillary attraction the fluid presented. But capillary attraction cannot produce motion beyond the limits of the solid body with which it is connected, and there are other forces operative, which must be taken into the calculation in the endeavour to explain the process.

OSMOSIS.—The simplest definition that has been given of the phenomena connected with this operation is the one by Matteucci of endosmosis, that "it is the mutual action of two liquids on each other when separated by membrane."[3] When osmosis takes place in the living body, the animal tissues are penetrated by fluids (either simple or charged with soluble matters) which are brought into contact with them, and all animal membranes

[1] Recherches Experimentales sur l'Exhalation et l'Absorption. Read before the Institute, and published. Paris, 1824.

[2] Lectures, p. 31.

[3] Lectures, p. 45.

are more or less pervious, so as to permit the transmission of fluid or aid in its accomplishment. This, however, takes place in accordance with laws which are determined by the character of the fluids and the structure of the tissue. The phenomena of osmosis are arranged into two series, manifested by a stronger and weaker current. The first of these correspond with *endosmosis*, and the second with *exosmosis*.

When the subject first attracted the attention of physicists, several hypotheses were given to account for the process. The fact most conspicuous was that when two fluids of different specific gravities were separated by membrane, there existed a tendency on the part of the lighter one to pass to the denser, and this naturally suggested the idea that the latter exerted an attractive influence. Indeed, the direction towards denser fluids of lighter ones renders the porosity of animal membranes most conspicuous. Thus, if a section of fresh chicken's intestine be tied at one end, then half or three-quarters filled with a solution of sugar, and, after being tied at the other end, thrown into a vessel of clear water, in a little time it will become distended, the water passing into the intestine so as to augment the sugary solution.

It was suggested that viscidity is the cause of the attraction, but this conjecture has been proved to be erroneous by an experiment of Dutrochet with a solution of sugar and one of gum-Arabic. If corresponding weights of sugar and of gum be dissolved in the same weight of water, the viscidity will not be uniform; that of the gum solution will be greatest. Now, if these be separated by membrane, the direction of the current will be in excess from the gum solution to that of the sugar; and this will be the case if the strength of the former be doubled, the specific gravities then being as 1.023 to 1.014.

Another violation of the rule that specifically lighter fluids pass to the denser is exhibited by alcohol and ether, which are of less specific gravity than water, and yet the latter passes the membrane to them. In the instance of vegetable acids we have a remarkable illustration of the same fact. Thus, a saturated solution of oxalic acid, sp. gr. 1.045, at 77° F., when placed in contact with water separated by membrane, passes to the latter, with augmentation of its bulk and a diminution of its own specific gravity. This experiment was constant in its results, and it appeared that the denser the solution the stronger was the current. Citric and tartaric acids are more soluble than oxalic, and a denser solution can be made of them. When solutions were made of sp. gr. 1.05, it did not appear that an attraction for water existed so as to lead to augmentation in the bulk of the solutions, but there was a reciprocal penetration of the water and the acid through the membrane. At a sp. gr. above 1.05, the water passed to the acid solution, and below this density, as in the case of oxalic acid, the acid solution passed to the water.[1] It is evident from these results that density *per se* is not a cause of the increase of bulk in connection with endosmotic movement.

The question which presented itself to Dutrochet was, whether the power of ascension in capillary tubes is in any way a measure of endosmotic force, and whether it coincided with the facility of penetration. It has been stated that water passes to alcohol and ether, and both of them have less ascending power than water; while solutions of the acids mentioned, having less ascending power than water, when below the sp. gr. of 1.05, pass to the water. This, then, does not throw light upon the subject any more than

[1] Dutrochet. Mémoire.

does the rapidity of penetration through capillary tubes or membrane, for it was found by Liebig that a solution of gum was less readily filtered through a capillary tube than one of sugar; and yet, when even of double the strength, the former augments the latter through membrane. The solution of oxalic acid was found to filter through membrane less rapidly than water.[1]

The cause of osmosis to be first examined is that connected with *imbibition* by animal membranes, or the capillary absorbing power with respect to fluids, and this has been found to vary with different liquids. It may be characterized as an *affinity* of membranes for fluids, which is diverse. Pure water is readily imbibed by membrane, while the absorbing power for solution of salt diminishes in the ratio of saturation of the solution. A mixture of water and alcohol is taken up also in proportion to the dilution. Liebig found that 100 parts of ox-bladder take up in 24 hours—

Of	pure water	268 vols.
"	saturated solution of sea salt (brine) . . .	133 "
"	alcohol of 84 per cent.	38 "
"	oil of marrow	17 "

And 100 parts by weight of ox-bladder take up in 48 hours—

Of	pure water					310	parts	by weight.
"	mixture,	$\frac{1}{2}$	water,	$\frac{1}{2}$	brine . . .	219	"	"
"	"	$\frac{1}{3}$	"	$\frac{2}{3}$	" . . .	235	"	"
"	"	$\frac{1}{2}$	"	$\frac{1}{2}$	" . . .	288	"	"
"	"	$\frac{1}{2}$	alcohol,	$\frac{1}{2}$	water . . .	60	"	"
"	"	$\frac{1}{3}$	"	$\frac{2}{3}$	" . . .	181	"	"
"	"	$\frac{1}{4}$	"	$\frac{3}{4}$	" . . .	290	"	"[2]

When *Endosmosis* takes place, there must be a superior affinity between the interposed membrane and one of the fluids, or, in other words, for one of them the membrane must possess a greater imbibing tendency. If alcohol be confined in a bladder, and exposed to the atmosphere, the water passes through the bladder and evaporates, thus concentrating the alcohol; but when a membrane of India-rubber is used to separate water and alcohol, the alcohol penetrates the septum, and passes to the water. In these examples we have illustration of an elective affinity on the part of membranes.

Imbibition through membranes varies in accordance with the surface which is exposed to the entering liquid. If the most porous surface be placed in contact with it, the entrance of the fluid will be promoted. If the reverse be presented, the introduction of the fluid will not be so active; and should the most porous surface be brought in contact with alcohol or

[1] Difference in passing through a capillary tube:—

Equal quantity of water					time required,	157	seconds.
"	"	"	Sol. of sugar, sp. gr. 1.014,		"	159	"
"	"	"	" gum, "	"	"	262	"
"	"	"	" " "	1.023,	"	362	"

In filtering by gravity, at 69° F., the time being the same:—

Water passes to the extent of	24	parts.
Solution of oxalic acid, sp. gr. 1.005	12	"
" " " " 1.01	9	"

This was the result when each fluid was placed above the same fluid, but separated by membrane.

[2] The same facts were presented when experimenting with pig's bladder. Researches on the Motion of the Juices of the Animal Body, by Justus Liebig, p. 135. (*Op. cit.*)

coagulating solutions, the probability is that a restraining influence will be exerted from a change in the surface by the action of such fluids.

Pressure exercises an influence upon the passage of fluids through membranes, and the degree of it required for different fluids has been found to be varied.

In experiments upon the force required to produce the passage through membranes when simply moistened by the fluid, it was found by Liebig that this depends upon the thickness of the membrane, and that through ox-bladder $\frac{1}{10}$ of a line in thickness—

Water requires a pressure of	12 in. of mercury.
Saturated solution of salt	18 " "
Marrow oil	34 " "

When the membrane used was the peritoneum of the calf, $\frac{1}{20}$ of a line thick—

Water required a pressure of	8.10 in. of mercury.
Solution of salt	12.16 " "
Marrow oil	22.24 " "
Alcohol	36.40 " "

Alcohol, then, the most limpid fluid, and having the least specific gravity, requires the most pressure.

From the above experiments it appears that the amount of pressure required is inversely as the force of capillary attraction; that is, where the greatest capillary attraction exists, there less pressure is required.

The force of capillary attraction is in many cases so great as to be capable of equipoising a considerably opposing force. If, for instance, a glass tube be so tightly closed by bladder that no fluid can penetrate between the glass and the animal membrane, and if it then be filled with water, the capillary attraction of the bladder will retain the water with so much tenacity that the pressure of a column of water several feet high will not be able before a period of several hours to force any appreciable quantity of water through the bladder, and many days, or even weeks, will intervene before a column of water several inches in height, and whose base covers the surface of the bladder, will be able to penetrate through the membrane. The resistance of capillary attraction is not, however, absolute, as the pores may be unequal. The simplest exhibition of capillary force is in the case of water rising in blotting-paper in opposition to gravity,[1] and it is apparent from experiments that the mechanical influence exercised by a permeable substance upon the fluid penetrating into it consists in the fluid being attracted by the substance with a force that opposes a certain resistance to other mechanical forces acting on the fluid, as gravity, hydrostatic pressure, &c.[2]

When fluids of similar properties are separated by membrane which is permeable, if the hydrostatic pressure be equal on both sides, no change will occur. If, however, the pressure be stronger on one side than the other, a certain quantity of the fluid under pressure will pass to the other.

[1] Vogel, Chemical Reports and Memoirs, Cavendish Society, pp. 93, 94.

[2] This force has been recognized and applied to the purposes of lifting weights and splitting rocks.

Different kinds of filters furnish examples of the varied manner in which mechanical capillary force acts in individual cases. If a fluid be poured into a funnel, it will run through more rapidly than when it has first to pass through a filter. In the latter case the impediment is afforded not only by the opposing solid body, but by the resistance of the capillary attraction in the interstices or pores. In many filters this is considerable. (Vogel, *op. cit.*, pp. 93, 94.)

This quantity will correspond to the excess of pressure on the one side, allowing for the resistance opposed to the pressure by the mechanical capillary force.[1]

Mucous membrane readily permits the passage of liquids. That of the stomach of the dog, the cat, and the lamb, and of the bladder of the ox were employed by Matteucci and Cimma in their experiments. With the different solutions used, the position favourable to endosmotic action was from the interior to the exterior surface, and between the two there was greater variety than with the skin of the eel, the frog, or torpedo.[2]

The following conclusions were arrived at from the experiments of the above named experimenters :—

"1st. The membrane interposed between the two liquids is very actively concerned, according to its nature, in the intensity and direction of the endosmotic current.

"2d. There is, in general, for each membrane a certain position in which endosmosis is most intense, and the cases are very rare in which with fresh membrane endosmosis takes place equally, whatever be the relative position of the membrane to the two liquids.

"3d. The direction which is most favourable to endosmosis through skins is usually from the internal to the external surface, with the exception of the skin of the frog, in which endosmosis, in the single case of water and alcohol, is promoted from the external to the internal surface.

"4th. The direction favourable to endosmosis through stomachs and urinary bladder, varies with different liquids much more than through skins.

"5th. The phenomenon of endosmosis is intimately connected with the physiological condition of the membranes.

"6th. With membranes dried, or altered by putrefaction, either we do not observe the usual difference ensuing from the position of their surfaces or endosmosis no longer takes place."

Another phase of osmotic action is that which has been referred to as *Exosmosis*. While there is a tendency on the part of a lighter fluid to pass to a denser one through membrane, the denser may pass to the lighter and alter its specific gravity. Thus, while water passes through the parietes of a fowl's intestine to augment the sugary liquid solution contained in it, the sugary fluid itself will pass outwards to mingle with the water, and this to the greater extent as the intestine becomes distended.

An experiment, the reverse of that detailed in illustrating endosmosis, may be performed with the intestine of the fowl. If a section be completely filled with water, and thrown into a solution of sugar, the intestine will be partly emptied by the abstraction of the water, while the remaining water contained in it will assume the taste of sugar and greater specific gravity. If a portion of the intestine of a fowl be filled with a watery solution of gum Arabic and rhabarbarin, and when tied close, laid in a vessel of water, the intestine becomes tensely distended, and the rhabarbarin exudes from it. Similar experiments may be performed with albumen or saline substances.

Prof. Jolly, of Heidelberg, exhibited the same exosmotic phenomenon by the following experiment: A saline solution, containing a known quantity of salt, was placed in a glass tube, closed at the bottom with bladder; this was placed in water, frequently changing it to keep it pure. The tube and its contents were taken out from time to time, and weighed. This was repeated until the weight was constant. The absence of the salt was thus

[1] Vogel, op. cit., p. 93.

[2] Matteucci, Lectures.

demonstrated, and nothing but water remained.[1] Exosmosis and endosmosis, as will be exhibited hereafter, are both dependent upon the same principles; and we may regard exosmosis as it has been represented above, as analogous to the operation which has been termed dialysis by Prof. Graham.[2] But, while it is admitted that membranes have the power of imbibing fluids by capillary attraction with a force which differs for the several liquids, there exists a displacing power exerted by one fluid upon another, which frequently is at variance with and in direct opposition to the force with which a fluid is attracted by membrane, and it appears that those which even have less facility of being imbibed may displace others for which the affinity on the part of membranes is stronger. This is illustrated by the experiments of Liebig.

He found that 100 parts of animal membrane (dry ox-bladder) absorb in 48 hours 310 parts of water and only 133 of saturated solution of salt. If when saturated with water it be strewed with salt, a saturated solution of salt is formed which replaces the water. It follows therefore that as membrane has a capacity for 310 parts of water and for only 133 parts of the saline solution, there is a diminution of the absorbent power of the bladder to the extent of 177 parts, which are expelled, and run off in drops. A similar effect of reduction of fluid will take place if the membrane holding water be brought in contact with a solution of salt. "Membranes, fibrin, or a mass of flesh behave exactly in the same manner when in contact with alcohol. If placed in alcohol in the fresh state, that is, when they are thoroughly charged with water, there are formed at all points where water and alcohol meet, mixtures of the two; and as the animal texture absorbs much less of the alcoholic mixture than pure water, more water is expelled than of alcohol taken up."[3]

In connection with such displacement as is here exhibited there must be and actually is shrinking of texture. If the results presented in these examples depended solely upon capillary attraction, the anomaly would be presented of a weaker force overcoming a greater, inasmuch as the imbibing power is superior on the part of membrane for water to that for brine or alcohol.

The very opposite to the facts which have been stated is also found to occur. Thus if we tie over one end of a cylindrical tube a membrane (bladder) saturated with concentrated brine, by steeping for twenty-four hours, and if we dry the outer surface of the membrane carefully with bibulous paper, and now pour a few drops of pure water into the tube, so as just to cover the inner surface of the membrane; the outer surface is seen in a few moments to be covered with minute drops of brine; that is, brine flows out of the pores of the bladder. Mr. Whitelaw has detailed some experi-

[1] Elements of Chemistry. By Prof. Graham.

[2] In the case of exudation, pressure is an important element of power; under its influence in the vessels there must ensue the loss of fluid, as is illustrated in diarrhœas, dropsies, &c.

[3] 9.17 grammes of fresh bladder contain 6.97 grammes of water, 2.22 of dry ox-bladder; when placed for 24 hours in 40 c.c. of alcohol, the weight is 4.73 grammes, there has consequently been a loss of 4.44 grammes. In the 4.73 grammes which remain there is the 2.22 of dry bladder, and only 2.51 of liquid. If we assume that this liquid has the same composition as the surrounding mixture 84 per cent. of alcohol to 16 of water, it will consist of 2.11 grammes of alcohol and 0.40 of water, and therefore of the 6.97 grammes of water originally present, 6.45 have been expelled and replaced by 2.11 alcohol. For one volume of alcohol retained more than three of water have been expelled. (Liebig, *op. cit.*, 137.)

ments on the removal of the salt in brine contained in salted beef, by soaking in sea-water until the beef becomes comparatively fresh and expands like a sponge, resuming a part of the natural juices from the brine.[1] In these cases is exhibited the preponderating force of attraction for the fluid (pure water or a weaker solution of salt) for which there is the greatest affinity on the part of the membrane.

There can be no doubt, from the foregoing statements, that an important element in the displacement that occurs when brine or alcohol are brought into contact with water contained in membrane, so that the membrane retains a less amount of the mixture than of the water is the diminished absorbing capacity of the membrane, or less affinity for the mixture. The displacement, in the interstices of the membrane, of a fluid for which the membrane has greater affinity, by one for which it has less, cannot depend upon a cause residing in the membrane itself, other than the diminution of capillary attraction or power of imbibition.

It is evident that membrane has an attraction for fluids, or an affinity for them which varies for each, yet in the case of each is definite. If the membrane, therefore, has imbibed a fluid, and another is brought in contact with it so as to form a compound of the two for which the membrane has greater attraction, this will take possession of the membrane to the exclusion of the first contained in it. Thus, if the membrane contain a saline solution or alcohol and be brought into contact with water, and there be dilution of either fluid, the greater amount taken up of the diluted fluid would appear to depend upon the superior capillary attraction for that fluid which thus becomes the displacing fluid. Where contraction has taken place under the entrance of the first fluid, expansion will be brought about by the introduction of the second. But the reverse of this is also the case. If the membrane has imbibed a fluid and another is brought into contact with it, so as to form a compound fluid for which the membrane has *less attraction*, the fluid for which there is the *greatest affinity* is displaced, and the new one takes its place. A solution of salt will displace pure water, as has been seen, and the same is the case with alcohol. By sprinkling salt on moistened bladder the solution of salt formed will enter the intestines of the bladder to the exclusion of the water, which will appear in drops on the surface.[2] Meat is salted by sprinkling the salt upon the surface, and this operation is attended with contraction of fibre and loss of juices. It may be assumed, therefore, that as the displacement overcomes and is in opposition to superior capillary attraction, there is a *new force* brought into operation, and this is the *affinity* between the *two liquids* or of the liquid for the substance (salt for example) placed in contact with the membrane, which affinity is greater than that of the membrane for the fluid which it most easily imbibes. *If there be no affinity between fluids, the one for which the membrane has the least attraction will not take the place of the other, will not displace it.*

It is assumed by Liebig that the "relation of bladder, fibrin, and other animal substances, when saturated with water, to alcohol and brine, proves that the shrinking of these tissues does not depend upon the abstraction of water in consequence of the affinity of alcohol or salt for that liquid, as it is certain that the attraction of alcohol for water or water for alcohol are respectively equal. The attraction of water within the tissue for alcohol

[1] Dublin Medical Press, June 22, 1864. Med. News, Phila., Aug. 1864.
[2] Liebig, op. cit.

without, is just as strong as the power of the alcohol without to combine with the water within. Less alcohol is taken up and more water given out because the animal tissue has less attraction for the mixture of alcohol and water than for pure water alone."[1] So far as it goes, this statement is correct, but does not meet the difficulty of explaining why a less affinity on the part of membranes supplants a greater. It must be that the attraction of water for alcohol or of alcohol for water is superior to the attraction of the membrane for water, and hence it parts with it, and the alcohol without becomes diluted, while the water within becomes mixed with a certain proportion of alcohol. Hence it is that "this exchange is only arrested when the attraction of water for the animal tissue and its attraction for alcohol counterpoise each other."

In the case of fibrin or membranes containing alcohol or salines when brought into contact with water, the capillary attraction for the water being greater than for the alcohol or the salines, they can be displaced by it, yet the process is greatly facilitated by the power possessed by them of combination with water.

In all the cases that have been given, there is a power of combining between water and other liquids, a capacity of union between them which plays an important part in the phenomena of imbibition. But there are other instances in which the property of combination does not exist; thus Chevreul determined that when tendons and ligaments saturated in oil were placed in water, the oil is completely expelled, and they take up as much water as if they had not previously been in contact with the oil. Now as there is but the feeblest affinity between the oil and the water the introduction of the latter must depend upon the greater affinity of the membrane for it.

A dried bladder continues hard and brittle in alcohol and oil, its flexibility is in no degree increased by absorbing them. Although these fluids can be displaced from membrane by water, they can be assisted in their own introduction by it. In the case of oil, water may act by expanding the capillary pores, thus facilitating the entrance along with it. The fact is well known and acted upon by curriers, that by working and pressure moist leather can be made to take up more oil than dry. Again, leather that has been exposed to moisture becomes hard and dry by the expulsion of the oil, and before re-oiling it the surface should be sponged or moistened with water. In the filtration of oily matters it is best to moisten the filter so that the oil shall not clog the pores of the material used. In this way the oil can better pass through the pores which are moistened by the water, adhesion to them being prevented. Oil is introduced into the lacteals in the form of emulsion or of a saponaceous compound, by which the same influence is most effective.

The attempt has been made to show that where there is a faculty of combining between water and other fluids in consequence of mutual attraction between them, the mere power of imbibition on the part of membrane is not of primary consequence, it has a secondary office, for did displacement rest upon this power it would be perfect, and no salines or alcohol be left in the interstices of the membrane; whereas the displacement is limited by the dilution of the saline or the alcohol, and the membrane holds in its interstices a weaker solution, the amount retained being governed by the dilution. In other terms the force of combination

[1] Liebig, op. cit., p. 138.

between the saline or alcoholic solution regulates the nature and degree of the imbibition. It is not the mere attraction of the membrane for water which deprives it of salines, but the diluting effect of the water on the salines, and this latter depends upon the *force of chemical affinity between them.*

The power of imbibition, which has been considered, depending upon capillary attraction, accounts for the introduction of fluid into the interstices of membrane, but not for absorption into the vessels so as to form a part of the fluid material of the circulation, for, as remarked by Liebig, "liquids flow out of capillary tubes which are filled by them, *only when some other force or cause acts*, because capillary attraction cannot produce motion beyond the limits of the solid body which determines the capillary action. We are, therefore, under the necessity of seeking for an additional force which will explain the fact of a current from without setting into the circulation. This force resides in the power of *diffusion.*

The tendency of substances to extend themselves through fluids or of fluids to diffuse themselves through each other is the foundation of *solution*, and the force which operates under such circumstances is that of attraction. The solubility of substances depends upon this attraction on the part of molecules of solid soluble matter and the molecules of the liquid in which they can dissolve, and when in solution such substances can be further diffused so as to form a more dilute solution. In proportion to the strength and energy of the attraction is diffusive mobility exhibited by different substances, and, as remarked by Graham, appears to be as "wide as the scale of vapour tensions."[1] Diffusive attraction producing solution may take place in any degree below the point of saturation, where the force of attraction has its limit. "In a mixture of alcohol and water or of brine and water there is in every part the same proportion of particles of alcohol and water and of salt and water." The attraction which exists has been placed by Liebig under the denomination of chemical affinity, although it is not attended with alteration in the character of the molecules that are interested.[2]

In the case of solution there may be manifested an elective affinity, depending on the greater facility of solution possessed by one substance over another. The most soluble substances are dissolved with the greatest velocity. Thus, hydrate of potassa may be said to possess double the velocity of diffusion through water of sulphate of potassa, and, again, double the velocity of sugar, alcohol, and sulphate of magnesia (Graham). If oil and salt are combined and water added, the larger proportion of the salt will be given up to the water in consequence of elective affinity. Liebig has given some pertinent illustrations of the same fact. If a solution of sulphate of potassa be formed and liquor potassæ be added, the sulphate will be separated, obeying the natural attraction of its particles and crystallizing, in consequence of the superior affinity of the potassa for water. Alcohol will separate a number of salines from water. When hydroferrocyanic acid is liberated from ferrocyanide of potassium in solution by diluted muriatic acid, it is held dissolved by the water, but if the vapour of ether be passed through the solution the whole of the acid is set free in the form of white or bluish-white crystalline scales, so as to become a semi-solid mass.

[1] Liquid Diffusion, Graham, p. 185, Philos. Trans.
[2] Researches, &c., op. cit., p. 150.

The same view of solution that has been presented is taken by Vogel, who states "if two fluids whose constituents chemically attract each other come in contact, they will combine and form one mixed fluid, homogeneous in its nature, of which each smallest particle will exhibit a like property. If, for instance, we mix a fluid consisting of twenty parts of salt and eighty parts of water with one hundred parts of water, a solution will be formed, the smallest distinguishable particle of which will contain nine parts of water to every part of salt." If we suppose the two commixing fluids be separated masses, then the constituent particles of each will attract those of the other, and conversely. This species of attraction is stronger than that existing between the constituents of each body among themselves. Thus, atoms will pass from *a* to *b*, and again from *b* to *a*, until both fluid masses have become chemically equal; that is, have assumed a like composition. If a lump of sugar or alum be placed in water, the particles will tend to separate and diffuse themselves, the attraction of the water for the sugar or alum, and of the sugar or alum for the water overcoming the attraction between the particles of either.

This attraction may take place laterally, and as the particles of the substance must thus pass through all the particles of the solvent until the last are reached, by transmission, as it were, from one to another, a longer time is required. The same also happens where solution goes on upwards. A downward solution is aided by gravity, as where sugar is suspended in water. If the body be heavy which is to become commingled with a fluid and has to ascend, or the material be light and floats on the solvent, a greater time must be consumed for the diffusion to be effected. For instance, a solution or a lump of salt at the bottom of a column of water will be longer in reaching the surface of the water, while alcohol, on a similar column of water, will also be longer in diffusing itself, both being in opposition to gravity. Motion, whether from heat or a mechanical cause, promotes attraction by the more rapid diffusion of molecules or the production of currents.

The degree and the velocity of diffusion possessed by different substances have been investigated by Prof. Graham, by whom most interesting results have been obtained. He has divided substances which are soluble into two kinds, *crystalloids* and *colloids*, the latter so called from their behaviour like glue in the presence of water. The results observed were in opposition to gravity, which method presents the strongest test of attracting force. To this method Prof. Graham has given the appellation of "jar diffusion;" it is practised in the following manner: A saline or other solution is placed at the bottom of a jar, and then water placed above the stratum. After a certain time the amount of the saline, which has raised itself upwards, may be determined in the various strata of water. In this way the relative attraction or solution of different soluble substances may be determined. For the sake of illustration, the following table is presented, the experiments having been conducted with two crystalloids, *salt* and *sugar*, and two colloids, *gum* and *tannin*:—

Experiments showing the diffusion of 10 *per cent. solutions through pure water, after* 14 *days, at* 50° *Fahr.*

	Salt.	Sugar.	Gum.	Tannin.
Stratum 1	.104	.005	.003	.003
" 2	.129	.008	.003	.003
" 3	.162	.012	.003	.004
" 4	.198	.016	.004	.003
" 5	.267	.030	.003	.005
" 6	.340	.059	.004	.007
" 7	.429	.102	.006	.017
" 8	.535	.180	.031	.031
" 9	.654	.305	.097	.069
" 10	.766	.495	.215	.145
" 11	.881	.740	.407	.288
" 12	.991	1.075	.734	.556
" 13	1.090	1.435	1.157	1.050
" 14	1.187	1.758	1.731	1.719
" 15	2.266	3.783	5.601	6.097
	9.999	10.003	9.999	9.997

The superimposed column was 4.38 inches in height, 111 millimetres in all. The first stratum of chloride of sodium contained 1 per cent., and the first stratum of sugar contained .005, which shows that the sugar had just reached the top. In the case of the gum and tannin, the seventh stratum presented decided evidences at the height of 2.2 inches. What is above that the experimenter attributes to accidental dispersion.

Experiments with sulphate of magnesia, and albumen and caromel, both colloid substances. Diffusion of 10 *per cent. solutions for* 14 *days.*

	Sulph. magnes. at 10° R.	Albumen at 13°–13°.5 R.	Caromel at 10°–11° R.
Stratum 1	.007	.000	.000
" 2	.011	.000	.000
" 3	.018	.000	.000
" 4	.027	.000	.000
" 5	.049	.000	.000
" 6	.085	.000	.003
" 7	.133	.000	.005
" 8	.218	.010	.010
" 9	.331	.015	.023
" 10	.499	.047	.033
" 11	.730	.113	.075
" 12	1.022	.343	.215
" 13	1.383	.855	.705
" 14	1.803	1.892	1.725
" 15	3.684	6.725	7.206
	10.000	10.000	10.000

This table shows the *attraction of solution* which lifts the heavy particles from the bottom, and it likewise exhibits the difference between the solubility of crystalline and colloid bodies. The albumen did not in fourteen days advance to the seventh stratum, while the caromel only reached the sixth stratum.

By the further tabulated experiments of Graham it will be found that diffusion, in relation to time, is progressive, but not entirely uniform. The longer the time, the more complete the diffusion from persistence of the attracting force; thus, with chloride of sodium, in four days the upper stra-

tum contained .004, while, as has been shown by the above table, in fourteen days it reached .104. The disparity of diffusion between crystalloids and colloids is shown in relation to time; thus, sugar advances in two days nearly as much as albumen in fourteen days. There is some disparity in point of time, when substances are compared with each other, as it appears that a fourteen days' diffusion of sugar is greater in amount than a four days' diffusion of chloride of sodium, but less than a five days' diffusion of that substance. The diffusion of chloride of sodium appears to be pretty nearly three times greater or more rapid than that of sugar. Experiments made with hydrochloric acid and chloride of sodium show that the diffusion of the first in three days closely corresponds to that of the second in seven days.[1] The rapidity of mixture or solution depends on the *degree* of chemical affinity between fluids or substances and their solvent, the mobility of the particles of one or the other having a favourable or unfavourable influence on the result; fluids or substances of tough, viscid consistence have feebler affinity, their own cohesion being with greater difficulty overcome. There is another element in calculating the rapidity of diffusion which must be taken into consideration; it is the lessened attraction as fluids imbibe the diffusing matter. According to Prof. Graham, the general law which regulates such movements with reference to salt appears to be this: "The velocity with which a soluble salt diffuses from a stronger to a weaker solution is proportional to the difference of concentration between two contiguous strata."

Substances when in solution together, so as to form a compound solution, obey the force of diffusive attraction as when they are separate, and in this case the inequality of diffusion becomes apparent if there exist a difference in the solubility. Sugar and gum, when united in solution, will diffuse themselves as shown by the table. A mixture of two salts being placed at the bottom of a jar, it may be expected that the salts will diffuse pretty much as they do when they are diffused separately, the more diffusive salt travelling most rapidly, and showing itself first and always most largely in the upper strata. The early experiments of Prof. Graham on diffusion from phials had shown indeed that inequality of diffusion is increased by mixture, and the actual separation is consequently greater than that calculated from the relative diffusibilities of the mixed substances. According to these experiments, chlorides of potassium and sodium diffuse nearly in the proportion of 1 to .841.

[1] The general results of several series of experiments may be expressed approximatively thus, with respect to time:—

Hydrochloric acid	1
Chloride of sodium	2.33
Sugar	7
Sulphate of magnesia	7
Albumen	49
Caromel	98

(*Graham.*)

Diffusion of a mixture of 5 per cent. of chloride of potassium and 5 per cent. of chloride of sodium, for 7 days, at 12°–13° R.

	Chloride of potassium.	Chloride of sodium.	Total diffusate.
Stratum 1	.018	.014	.032
" 2	.025	.015	.040
" 3	.044	.014	.058
" 4	.075	.017	.092
" 5	.101	.034	.135
" 6	.141	.063	.204
" 7	.185	.104	.289
" 8	.252	.151	.403
" 9	.330	.212	.542
" 10	.349	.351	.700
" 11	.418	.458	.876
" 12	.511	.559	1.070
" 13	.552	.684	1.236
" 14	.615	.772	1.387
" 15	1.385	1.551	2.936
	5.001	4.999	10.000

In the upper portion of the table, chloride of potassium always appears in excess, but not in so large a proportion in the first three strata as the fourth. The first six strata contain together 561 milligrammes, of which 404 mill., or 72 per cent.—that is, three-fourths—are chloride of potassium. In the lower strata the chloride of sodium preponderates, and only at the tenth stratum is there an equilibrium. Prof. Graham remarks that "the preceding experiment might be so conducted as to diffuse away the chloride of potassium, and leave below a mixture containing chloride of sodium in relative excess to as great an extent as the chloride of potassium is found above in the last experiment." From this and analogous experiments the author concluded "that by repeating the diffusive rectification a sufficient number of times, a portion of the more diffusive salt might be obtained at least in a state of sensible purity."

When an experiment similar to the foregoing was conducted with salts of the same base, as the chloride of sodium and sulphate of soda, the separation was more apparent. The six upper strata contained 90.8 per cent. of the chloride of sodium, and the upper eight strata contained 83.9 per cent.

Heat appears to promote diffusion, but does not seem to facilitate the separation of unequally diffusive substances. At low temperatures, again, diffusion is proportionally slow.

It is certain, from the foregoing exposition, that, in connection with solution, there is a force upon which depends the diffusion of the particles of soluble substances through fluids, and that this force not only lifts them, but retains them in a state of diffusion in opposition to gravity and to the disposition which they have naturally by cohesive attraction to come together. This force is always in existence where soluble substances are in contact with the solvent, and, as is seen in the tables, there is a tendency to diffusion by which the particles of both the substance and fluid unite together. This tendency is only limited by the complete and thorough diffusion of the particles, which may move in all directions; consequently saline particles may move to aqueous particles, as well as aqueous to saline, by virtue of their mutual attraction. When thorough union is accomplished, there is an *equilibrium of saturation*, the solution then being

uniform in composition. When an equilibrium is established, the addition of new fluid will again produce attraction, which will commence where the solution and the liquid meet, and will not cease to exert its influence until there has been a thorough incorporation of particles. If a liquid has taken up all of a solid with which it can combine, it is said to be *fully saturated;* but where this point has not been reached, and complete diffusion has not taken place, the force continues in operation by which this will sooner or later be accomplished. It requires only time, or may be assisted by mechanical or other means. In the production of solution there may be said to be a tendency to *uniform saturation.*

The principles of diffusion connected with solution which have been presented have an important bearing upon the process of absorption, which takes place through membranes in the animal economy. The effect of interposed membrane between fluids which have the tendency to unite and diffuse themselves is but to retard the result, the extent of surface presented regulating the extent to which mixture can take place. When a tube closed with bladder and filled with brine is left for a long time with the closed end immersed in pure water, the amount of salt in the latter increases, while that of the brine diminishes, till, at last, the two liquids, separated by the bladder, contain the same relative proportions of salt and water. It was found by Mr. Graham[1] that common salt diffuses into water through a thin membrane of ox-bladder deprived of its outer muscular coating, at the same rate as when no membrane is interposed. We may perform the reverse experiment of placing water in a tube and immersing its closed end in a solution of salt or alcohol, when the saline or alcohol will penetrate to the water.[2]

Every membrane must be regarded as a septum of capillary pores, into which the fluids can penetrate. When on one side of a membrane a liquid is placed containing a substance (a saline for example) in solution, and on the other side water, a mixture is formed in the interstices of the membrane. This mixture is a diluted state of the saline solution, and occurs in consequence of the attraction between the saline particles and water. The tendency on the side of the water is to dilution in consequence of the attraction of the membrane for water, and on the side of the saline for concentration of the solution in the membrane in consequence of the attraction of the saline for the water, or its diffusive tendency. This force then overcomes the attraction of the membrane for the more diluted liquid. There is a struggle or alternation between the two forces, viz., the superior attraction of the membrane for the diluted fluid and of the saline to diffuse itself into this fluid, and concentrate it. These are alternately operative with a changing capacity on the part of the membrane, and hence the expansion and contraction which must attend the operation of osmosis. This diffusive attraction of the salt for the water is the true reason why the membrane yields its superior attraction for the water to an inferior one for the saline solution, it is the force which displaces the water or a diluted solution with the introduction of a stronger one into the membrane, giving rise to currents and suction. Through the membrane, then, the effort of equilibrium of solution is being accomplished, which is facilitated on the side of the membrane where imbibition most readily takes place, and is retarded on the

[1] Chemistry, p. 497, Am. ed.

[2] The specific gravities of the two fluids are in all these cases changed—that of the denser fluid becoming reduced, while that of the lighter is augmented until they nearly approximate.

side where there is the least penetration; hence the greater diffusion of the more easily penetrating liquid with an increase in the volume of the liquid towards which it is directed. This is the solution of the question of the apparent superior attraction of one fluid for another on opposite sides of membrane and of denser solutions attracting lighter ones.[1]

The difficulty of explaining the introduction of articles into the circulation has arisen from the limited interpretation of osmotic phenomena presented by experiments with membranes. It has been supposed that a sensible increase in volume of fluid on one side or other, constituted the exemplification of osmotic action, and that this is under the control of affinities possessed by membrane. *The truth is that the mutual attraction between fluids, or of soluble substances for fluids, with the tendency to diffusion is the foundation of osmosis, and that the specific affinity of membrane* for fluids is *the regulator of the results which take place.* The first of these is the force which must enter into the calculation, while the latter is the modifying force by which phenomena are controlled. It is only by estimating these two forces jointly that the diversity of the effects manifested in the numerous experiments which have been made becomes intelligible.

It should be recollected that osmosis may take place both *with* and *without* increase of volume. This is an essential fact in the explanation of absorption, and where there is no increase of volume the membrane may be said to be *indifferent* or *neutral.* When a denser fluid is on one side of the membrane the current which is directed towards it is only for a time; it has its limit, and the limit is when a point of diffusion has been reached by an interchange of particles at which the membrane becomes indifferent. To a saturated solution of salt, half again of the volume will be gained of water in an endosmometer (200 parts will increase to 300), at which point the effect of the membrane appears to be lost. In this case the action of the membrane is exhibited when the surface of the membrane inclosing the saline is connected with the water by a single drop, which falls when the membrane becomes indifferent.

An exposition has already been given of the influence of pressure upon osmosis. Liebig has shown by a simple experiment that the force of attraction between a membrane and a fluid is equivalent to such pressure as can neutralize it. The experiment is performed by the pressure of mercury, which can be made to antagonize the force of attraction of the membrane for water, so that while the saline diffuses itself, there is no increase of volume. By neutralizing this force, the membrane becomes, as it were, indifferent, and takes no part in the operation, that is, becomes passive. What is equivalent to this may be produced by distension. A tube of membrane (a section of fowl's intestine) being filled with a solution of salt

[1] It has been remarked by Vogel, that where two fluids capable of being mixed are separated by a permeable substance, owing to the mutual chemical attraction exercised by the constituents of the one fluid on those of the other, both fluids will strive to become chemically equal, and this perfect admixture will always succeed as the final result of their being brought in contact, although in a shorter or longer time and attended by different accessory circumstances, whilst the volumes of the two fluids may either remain unchanged or the volume of one increase as that of the other diminishes. The only truly important practical point to be traced out in the arrangement of all experiments on this subject may be embraced in the following simple question: which constituents of the fluid *a* (as well with respect to quality as quantity) pass in a given time to *b*, and which pass from *b* to *a*? (Vogel, *op. cit.*, p. 98.)

when tied at both ends, and thrown into water, undergoes the introduction of the water into it. As the intestine becomes distended a pressure is produced upon the membrane which antagonizes the force of imbibition, and then diffusion of the salt externally goes on as if no membrane intervened. Neutrality is thus engendered.

The reverse of the preceding can also be brought about and the force of imbibition be converted into a true suction. If the membranous tube (intestine) be filled with water, then placed in a saline solution, and circulatory motion be given to the latter, in consequence of the continued renewal of the saline in contact with the exterior membrane, the water which has passed from the interior of the tube will be diffused away and rapidity given to the current. This will be equivalent to a renewal of the strength of the solution in contact with the membrane, and as the tendency is to the diminution of the current of imbibition by membrane in proportion to the fall in strength of the solution exterior to it, this is prevented, and a neutral state of the membrane does not occur.

In the accomplishment of osmosis it was assumed by Dutrochet that there is a stronger ingoing current (endosmotic) and a weaker outgoing current (the exosmotic). It has been shown by Liebig that saline and inferentially other matters, do not simply pass through membrane, without a certain amount of water, or, in other words, that these particles alone do not pass, but that there is an actual current. In liquids of different density the one placed above another, separated by membrane by colouring one of them the currents may be demonstrated.[1] The currents which are perceptible are not dependent solely upon diffusion, for in the process of concentration and dilution there is a corresponding process in the membrane of contraction and expansion; on the side of the saline or of alcohol there will be condensation and on the side of the water dilatation. The inherent elasticity of membrane conduces to these changes, and where there is an alternation of them there must be *continual motion.*

The point which constituted the anomaly in the phenomena of osmosis was the determination of the ability of fluids of higher specific gravity to pass to those of less specific gravity and even to increase their volume. That denser fluids should attract those of less specific gravity was regarded as the law and the reverse as an exception, not understood. In such an entanglement was Dutrochet and the earlier experimenters. In addition to the facts presented (page 137) the following may be given: When the two liquids are diluted sulph. acid sp. gr. 1.093 and water, the acid at 50 F. increases in volume; but if the acid be reduced to a sp. gr. 1.054, the volume of water increases. Diluted tartaric acid (11 parts to 89 water) and water mix through a bladder without change of volume, with more than 11 per cent. of the acid the volume of acid increases, with less, the water increases. It is evident from experiments that have been detailed that there is a density which is inimical to affinity for membrane, and hence the current in the direction of the fluid possessed of this density. Again, there may be a density which does not affect the affinity, so that to both the dense and the lighter fluids the membrane is neutral. In these cases the law of diffusion may prevail unimpeded, and there is an interchange without alteration in volume. Still further, there are substances which, when in solution, appear to have a superior affinity for membranes than water and a greater power of traversing them; thus oxalic acid which has a feeble power of saturation

[1] Liebig, op. cit., pp. 146–165, Am. ed.

even at that point passes to the water, and may even when added to other articles facilitate their passage, as for instance to sugar in solution. The same is the case with other acids when in solution below a certain sp. gr. as we have seen with sulphuric, tartaric, and citric acids.

It appears from experiments that a substance possessing the feeblest power of diffusion, or none at all, has little capability of being absorbed by and of passing through membrane, yet osmotic action may readily occur towards it. Thus albumen and other colloid bodies have comparatively a feeble diffusive power; and with respect to imbibition and exudation pure albumen possesses the least tendencies, which is an important circumstance, when its function in the operations of the economy is taken into consideration. It has been made obvious that with this feeble diffusive power, which is dependent upon the little comparative attraction between them and water, still the tendency of water to pass to colloids through membrane is very decided in consequence of the attraction of the water for membrane through which it passes to be imbibed by the colloid. If a clay cell or a glass tube secured by some animal membrane be filled with dried animal or vegetable matters, as fibrin, coagulated albumen, resin, mucus, &c., and put into a vessel of water, the water will penetrate through the membrane and pass from its inner surface to the substance chosen for the experiment, causing it to swell. Here no passage occurs outwards. The quantity of liquid which passes through the partition in a given time depends upon the superficies of the latter, upon the power of absorption by the interior substance, and upon its quantity. The same results will occur if instead of coloured substances some blotting paper or dried sponge be introduced into the tube, which simply exercise capillary affinity.[1]

When a solution of gelatine, of gum, or of albumen is made of the specific gravity 1.07, and exposed to the action of water through membrane, it has been found that the increase of the volume of the solution of gelatine amounts to 3, of solution of gum to 5, and of albumen to 12, which last is greater than of sugar, which is 11. Albumen, as was stated by Dutrochet, has the highest power with reference to osmosis. This explains the readiness with which water and diluted solutions can enter the circulation, for when liquids (either water or solutions) have passed the membrane, the diffusive attraction is brought into operation, and they are disseminated through the colloid matter.

Albumen is the basic colloid material of the blood, which may resolve itself into other colloid matter, as fibrin, &c. When supplied with the due amount of water, it presents the appearance of other liquids. Most authorities have taught that albumen is soluble, and consequently that it can undergo osmotic penetration. In the normal condition Dumas regarded it as miscible with water in all proportions, and only insoluble when coagulated. Berzelius regarded it as soluble; M. Denis first affirmed its insolubility and that it be dissolved by aid of an alkali. It is remarked by Mialhe "that if albumen were soluble and endosmotic, it could not maintain itself in the circulatory system, but would constantly traverse the coats of the vessels containing it, and would diffuse itself in the organism and be lost in the products of secretion." Regarding the albumen of the serum and the white of egg as possessed of the same properties, M. Mialhe experimented with both of them relatively to their osmotic properties. The membrane of the egg was used, and whether the white of egg or serum was

[1] Vogel, op. cit., p. 97.

employed, he found that no albumen exuded from the interior, although water and salines penetrated to the interior. When water is used externally, all the salines in connection with the albumen are diffused through the membrane to that liquid. Water penetrates freely to albumen in an egg so as to burst the capsule in a few hours. Mialhe found that an egg weighed 2.5 grammes more (38 grains) by the absorption of water through its denuded capsule.

The absorption of substances, whether of a nutrient or medicinal nature, must be accounted for upon the principles of osmotic penetration. The blood which circulates in the capillary vessels is rich in albumen and colloid material, through which water and such articles as are held in solution can be diffused, while it also contains salines which have an affinity for water. The power of absorption varies in the several tissues depending upon their vascularity and physical structure. There is, moreover, an element to be considered in appreciating the rapidity of absorption, which is the maintenance of the current of the circulation—were not the blood in motion, the result of endosmosis in the vessels would be very limited in amount. It is by the constant action of new liquid in the vessels, in connection with outside solutions, that absorption is maintained. It can be easily understood, therefore, that imbibition goes on, other circumstances being favourable, in proportion to the freedom of the capillary circulation. Should this be clogged or in a static condition, an impediment is presented.

In connection with absorption there are two separate acts, *imbibition* and *transmission*. By the first the fluid substance enters the bloodvessels, and by the second it is diffused, and by the circulation of the blood is directed to the heart and to the several organs of the body. As has been explained in discussing the forces by which osmosis is accomplished, the first act in the introduction of liquid into the circulation is in accordance with the affinity of the liquid for the membrane. Water can easily penetrate, and then being diffused through the albumen will circulate with it and the salines. But the question arises with respect to saline and other solutions. The same law must hold here as with other membranes. Although the capillary vessels have less affinity for saline solutions than for water, still they will penetrate in proportion to their dilution, and the difficulty of introduction will augment in proportion to the increase of their strength. By those writers who adopted the explanation derived from the experiments of Dutrochet, great stress has been laid upon the necessity of a liquid which enters the circulation being of less specific gravity than the blood. This, however, resolves itself into the greater facility with which dilute solutions can become obedient to osmotic action. The sp. gr. of the blood is 1.028, and it contains from three-fourths to one per cent. of saline matter, so that liquids of less specific gravity will be more likely to enter the vessels and be diffused, but as has been shown, for instance with respect to acids, this is not an invariable law. It is not the denser solution within the vessels which attracts the liquid without, but the lighter external liquid possessing a greater facility of penetrating the vessels, and after having penetrated of diffusing itself by the attraction between it and the liquid within. If the liquid on the outside of the vessels have a higher sp. gr. than the blood, there will be a greater difficulty of introduction into them, *but not an exclusion;* a certain quantity, though less in amount, will be imbibed by the vessels, and from them be yielded to the watery and albuminous elements of the blood; indeed, as a colloid, the albumen becomes a medium of liquid diffusion like water itself. The same explanation applies

to alcohol and ether, which in the concentrated state have little penetrating power from the feeble affinity for membrane, but acquires both by dilution.

Dr. Graham uses the term *dialysis* in its application to the method of separation by diffusion through a septum of gelatinous matter. If a solution of salines (or crystalloids) be on one side of a septum and water on the other, the tendency will be for the passage of the salines to the water, and an equalization of saturation. This will be facilitated by motion.[1] In the same way, other articles may be diffused by dialysis. If the blood, a solution weaker in salines, then be separated from a stronger solution of them, there will be a tendency to the same equalization by dialysis into the vessels, there being a constant change in the strength of the fluid circulating in them. This introduction of solutions is not confined to a single one; several articles may be dissolved in the same fluid, and as has been shown by Prof. Graham, may be jointly diffused so that it is as easy to understand the entrance of a compound solution as of a single one. In the same way may be explained the separation of the soluble composite elements of the food in the process of primary nutrition. A selection is thus effected.

Some interesting experiments, proving and illustrating the agency of the circulation, were performed by Matteucci. If a living frog be immersed by its inferior extremities only in a solution of ferrocyanide of potassium, and the animal soon after be killed, scarcely any traces of the salt can be detected in the muscles of the legs and thighs, whereas the heart and lungs give very distinct evidence of it when touched with the chloride of iron. If the animal be kept for several hours in the solution, then the viscera will be penetrated by it through the circulation; but if the animal be killed, and the hind legs immersed for a short time, the heart and lungs will not be more imbued with the salt than other parts of the body. In explanation of these experiments, he states that—

"The solution was introduced into the body of the frog simply by imbibition, and this phenomenon, being effected in the living as well as in the dead frog, certainly cannot be regarded as different from the imbibition that has been presented, which belongs both to organic and inorganic bodies, and which is the consequence of these cellular and vascular structures. But there is something more than this. In the heart and lungs of a living frog we find a much larger quantity of the absorbed solution than in the other parts of the body, although these latter were much nearer the part immersed. The viscera mentioned are the centre of the circulatory system; in them commence or terminate the trunks of the bloodvessels; the solution of ferrocyanide, therefore, penetrates the bloodvessels by imbibition, becomes mingled with the blood, thus arriving at the heart and lungs."

Another simple experiment proves the same facts. If two frogs are taken,

[1] An experiment bearing upon this point by Poisseuille may be stated. Phosphate of soda in a four per ct. solution being placed in an endosmometer and serum external to it, the solution augmented from 18 to 30–34 millimetres—after nine hours it stood at 20, and in fifteen hours at 8 millimetres. The membrane had ceased to osmose on the second day, but by shaking the endosmometer and agitating the serum the layers of liquid in contact with the membrane were altered and the osmose was renewed, the column mounted to 4 millimetres in an hour and then fell to 1. The serum of the vase was replaced by distilled water, when endosmose was renewed, and the column mounted in an hour to 54 and 60 millimetres, then in four hours fell to 54 and 48 millimetres. On the sixth day the membrane had not lost its power. This experiment is an illustration of the difference between ingoing and outwardly flowing currents, depending upon the capability of membrane. (*Comptes Rendus*, 1843.)

and from one the heart be removed, it will be found that both are active. Now, upon placing both in a large glass, containing a solution of extract of nux vomica, the animal with the heart is soon poisoned and long before the other becomes affected.

That permeability exists in living tissue, irrespective of circulation, was proven by an experiment recorded by Prof. J. K. Mitchell in his paper on the *Penetrativeness of Fluids.*[1] He there states that while engaged in investigating Magendie's theory of venous absorption, he coloured the diaphragm of a living cat blue by placing a solution of prussiate of potassa on one side, and that of sulphate of iron upon the other.

The physical conditions requisite for vital absorption are:—

1. A vessel or structure with organic sides or walls.

2. An exterior liquid capable of being imbibed by the tissue composing the walls.

3. An internal liquid, also capable of being imbibed by the walls, of intermixing with the exterior liquid, and of circulating in the vessels more or less rapidly.

From the *first essential condition* it is evident that the facility of absorption in different organs depends upon the vascularity that is present, as well as upon the flaccidity of their tissue, and the conducting property of the parts composing them. Where the greatest vascularity exists, there are the greatest number of points of imbibition, as well as a more active circulation to carry away the matters that have been absorbed. The lungs possess this power to a greater extent than any other organs, because more vascular, more delicate in texture, and having a shorter round of the circulation. The cellular tissue, on the contrary, while having the power of imbibition, is not provided with so active a circulation, and hence absorption is slower. By removing the cuticle from the skin, substances may be brought more directly in contact with the vessels, and absorption be facilitated. Mucous membrane readily permits the passage of liquids. That of the stomach of the dog, the cat, and the lamb, and the bladder of the ox were employed by Matteucci and Cimma in their experiments. The position favourable for endosmotic action was from the interior to the exterior surface. The vascularity of the mucous membrane of the alimentary canal and its great extent of surface will account for the facility possessed by it of absorbing water or fluids composed of substances in solution.

With respect to the *second condition*, an external liquid capable of being imbibed by tissue, it may be assumed that all substances, in order to secure their introduction, must be in solution, and that solid substances, no matter how finely reduced, are precluded from entrance into the tissues by imbibition. Solid articles, which are insoluble in water, are constantly employed as medicines; their exhibition being followed by decided effects upon the organs of the economy, it is clear that such articles are transformed into soluble matter by the chemical reaction which takes place between them and other elements with which they are brought in contact in the organs. A knowledge of chemical changes in the presence of other bodies has enabled us to explain the results which are obvious in such cases.

With reference to the *third condition*, it is well known that the blood fulfils all the requisites presented; its water and matters in solution are capable of being imbibed by the walls of the vessels, of intermixing with the exterior liquid, of receiving accessions from it, and of circulating in the

[1] American Journal of Medical Sciences, Nov. 1830.

vessels. The freer the circulation the more rapid the absorption, and hence a greater absorbing power exists in the veins than in the lacteals or the lymphatics.

While the blood circulates in the vessels with a given velocity, the walls of the vessels are, in the normal state, far less permeable by it than by the other fluids of the body. Should the volume of the blood increase by absorption, it is counteracted by the antagonizing action of the kidneys and other emunctories.

In estimating the circumstances favourable to the passage of fluids through membranes, it should not be overlooked that pressure is conducive to such effects. How far pressure is conducive to endosmotic action, as it is derived from the actual weight of the atmosphere, has not been determined, but it is very clear that pressure is operative in exosmotic phenomena, as is illustrated in the exudations and effusions that take place in organs. Many substances, as, for instance, the thinner animal membranes, are expanded by the pressure of the column of fluid resting upon them, and thus their efficient surface is increased, while their texture is changed, their thickness diminished, and their pores enlarged.

From the foregoing exposition of absorption we may arrive at the following conclusions:—

That the introduction of fluids containing dissolved substances is due—

1. To the force of capillary attraction which exists to a greater or less extent between membranes and fluids, which modifies the result and renders the process easy or difficult.

2. To molecular or chemical attraction between fluids of different specific gravities which are capable of being commingled and becoming homogeneous.

3. That absorption is aided and rendered active by the circulation in the vessels by which the fluids interested are constantly changed in their relation to each other.

That there are certain forces in operation in connection with cell action that must have an influence in controlling the introduction of substances becomes apparent when the difference is adverted to of selection of articles by different vessels in the same structure. Thus, oil or fatty matters when worked into emulsion or chemically altered are preferably taken in by the lacteals, while sugar and other like articles are readily absorbed by the veins. There is no doubt that these forces are not distinct from those which regulate absorption in general, and are dependent upon the same principles of explanation.

In opposition to the opinion that medicines enter the circulation, it has been alleged that their effects are produced so rapidly as to preclude the possibility of their being absorbed. The point in question has been carefully examined by Mr. Blake,[1] who arrived at the conclusion that the rapidity of the action of a poison was in proportion to the rapidity of the circulation. He found that an interval, always more than nine seconds, elapses between the introduction of a poison into the capillaries or veins and the first symptoms of its action. In dogs, a substance which does not act on the capillary tissue passes from any part of the vascular system back to the same part again in from twelve to twenty seconds. Prof. Hesing, of Stuttgard, found that the time which a solution of ferrocyanide of potassium, injected into the jugular vein, requires to reach that of the

[1] Edinburgh Med. and Surg. Journ., vol. 53, p. 24.

opposite side, was in various experiments from twenty to thirty seconds.[1] With reference to prussic acid, Dr. H. Meyer determined by his experiments that killing by this poison, although a rapid process, is by no means so instantaneous as formerly supposed, generally only after the lapse of one minute and a half, and it is well known that this is one of the most rapid of poisonous articles.[2] The argument, therefore, against the introduction of sedative poisons, based upon the time of their operation, has no intrinsic force. J. C.

ART. XXI.—*Medical Errors. Fallacies connected with the application of the Inductive Method of Reasoning to the Science of Medicine.* By A. W. BARCLAY, M.D., Cantab. and Edin., Fellow Roy. Coll. Phys., Physician to St. George's Hospital, &c. &c. 12mo. pp. 123. London: J. Churchill & Sons. 1864.

AN extensive subject is here presented; capable of occupying a much larger volume. Medical errors form *pars magna* of medical literature. Diogenes could hardly need to search longer for a man in Athens, than Stuart Mill among medical writers for a logician. Is it not the principal advance of the last century, that we have been relieved of many errors which, if they did not rule medical practice, at least burdened it greatly? A natural effect of the discovery of those errors, and of the unscientific basis of much prevailing practice, has been an era of medical scepticism, in which we now live. It is, therefore, of the utmost importance that a positive science of medicine shall be re-constituted of the materials within reach of the profession. Induction is undoubtedly essential for this reconstruction. That its principles and methods, at once scientifically correct and practically available, should be understood by all medical students, practitioners, and teachers, is of great consequence.

Dr. Barclay has, in his published lectures, strongly asserted this, and has well illustrated it by examples. It may be regretted, however, that he has not been quite so felicitous in his discussion of the philosophy of the subject. To those who have read H. Spencer, Mill, Baden Powell, and Whewell upon similar topics, much is missed of the clearness with which, even with diverse views, those masters of the logic of science deal with it.

Such a criticism ought not to be made without some citation to justify it. Much of his language is clear and correct, but sometimes words are used in a manner liable to create confusion. Thus (p. 10):—

"While it is quite true that the hypothesis is very often suggested to the mind of the accurate observer by some harmony which arrests his attention, it is nevertheless true that in many cases it is a mere deduction; and in most of those which are classed as the highest inductions, there is a combination of both forms of reasoning, often united with an idea which is not the fruit of any reasoning process whatever, but is simply the bright offspring of genius."

Without an example of such a "bright idea"—which our author does not give—we are unable to imagine, among familiar instances of discoveries by induction, what part of any of them can be regarded as apart from

[1] Pereira, Elements of Mat. Med., vol. i. p. 154.
[2] London Medical Times, vol. ix. p. 432.

"any reasoning process whatever." Is it not commonly understood that the genius of Kepler, of Newton, or of Dalton, was a genius *for* reasoning?

Objection is made by Dr. Barclay to Prof. Laycock's stated principle, that medical theories are to be grounded on analogy, all their analogies having reference to one fundamental principle, which is stated to be "the unity of structure and function of organisms in time and space." This Dr. Barclay regards as not rightly called an inductive, but a deductive principle, indeed "an *hypothesis* assumed *a priori*, every argument based on it partaking of its hypothetical character." We hold that this ranks Dr. Laycock's principle at least as much too low as he may, perhaps, have placed it too high as a foundation of medical philosophy. The unity of structure and function of organisms is, as a proposition, itself the result of the largest induction. It is the major premise of every syllogism in physiology, pathology, and therapeutics, as the yet larger one of the *uniformity of nature* is held by Baden Powell[1] to lie at the basis of all science, being deposited there by the aggregate labours of observers in all departments; at once the result and the instrument of all induction.

Disadvantage belongs, it appears to us, to the use of the terms "empirical law," as applied by Dr. Barclay; or, again, "empirical law of limited significance" (p. 54); "difference between the laws of nature and empirical laws" (p. 61); "laws of the highest class, which absolutely govern matter, while those of the lowest class are only observable on special occasions, apply to a few individuals, and are liable to constant interruption," &c. (p. 60). Evidently there is here a twofold employment of the word "law," which *ought*, in science, to mean absolute fact, or invariable sequence—the relation in reason of certain things or events; but which he makes sometimes also signify the *statement* or *knowledge* of facts proved, or even only supposed to be shown, on an incomplete induction—mere approximations or hypotheses, not laws at all. These may vary, or be more or less absolute; laws *really* ascertained cannot, though our knowledge of them on complex subjects may often be very imperfect, and we cannot always at once explain exceptions to recognized laws by their conformity to others not understood.

Some will urge, too, that Dr. Barclay gives to the idea of *causation* too dominant a position in his theory of induction, while at the same time he employs it obscurely. Sparing the metaphysics of such a discussion, we must simply quote a few lines from a page (p. 58) intended to make clear "what is a correct induction."

> "Let us endeavour, before we proceed further, to ascertain what is meant by the term 'law.' In few words, it is an expression of the mode in which any given cause operates to produce a certain effect."—"It is not at all of the essence of a law to explain the production of any phenomenon, although it may greatly contribute towards such a result."—"We know nothing of the cause of gravitation, although there is no subject of which the laws are better understood. By the discovery of these laws, a great step was made towards an explanation of the causes which govern the motions of the heavenly bodies. In this we have an instance of the most elementary law with which we are conversant, and yet one which offers not the very least explanation of the cause which produces the effect."

In this we do not deny that our author's meaning may be apprehended, but it must be contended that it is not consistently expressed, nor can such language aid much the ratiocinations of a beginner in inductive philosophy.

[1] Essays on Inductive Philosophy, Unity of Worlds, &c., p. 98.

Dr. Barclay's consideration of the subject of "averages," though not always free from ambiguity of expression, is, mainly, very judicious. Algebraic calculation exhibits startlingly the necessity of a large number of cases to prove anything whatever clinically by mere statistics. When there are, for example, only four circumstances supposable whose presence or absence may determine a more or less favourable tendency in a series of cases, the variations possible, and which must be allowed for, are fifteen. With five such circumstances, the variations amount to thirty-one; with ten, to more than one thousand; with fifteen, to thirty-two thousand, and so on, and yet the following is not an over-statement of the circumstances to be taken into the estimate in all clinical observations.

"First, before the attack, the sex, age, and social position of the individual; his previous state of health, including early constitution, acquired habit, and the effect of the relative amount and purity of food and air; his actual condition, whether suffering from any minor ailment (to say nothing of major complications, which may be excluded), from actual privation or cold, or from any recent excess. Secondly, as regards the seizure itself; its immediate cause, its intensity, the rapidity of its development and progress, and the extent to which the special organ attacked is affected by it. Thirdly, the circumstances external to the patient influencing the progress of the disorder, such as his home, the means at his command, the friends that surround him, ignorant or well-informed, his nurse and his food, including stimulants as well as other nourishment; the skill of his medical attendant, and the judgment with which other subsidiary remedies are employed; if necessary, the influence which the conditions calling for their employment exercise over the disease, no less than the remedies themselves; and, perhaps more than anything else, the discretion with which the amount of stimulants is strictly limited to the exigencies of the particular case. Lastly, the wonderful and inexplicable influence of mind over body, the condition of hope or fear, of quiet confidence or restless anxiety." (p. 36.)

Well, indeed, then, may it be said of clinical facts, as it has been of experimental results in another department, "*non numeranda sed ponderanda.*" The practitioner goes through a frequently unconscious analysis of all these varying circumstances, in his estimate of cases occurring under his eye. His experience is worth more or less, according to his power to do this well or ill. But, when the thread of the facts is truly seized, when a "relation in reason" is found, one case to a gifted medical mind may be worth almost as much as a thousand to the mere routinist, or even to the mere statistician. Thus it is that the aggregate experience of the past in practical medicine has accumulated much that is invaluable and permanent with much, also, that is, or was, provisional only. It is as great an error to discard all of the former as to adopt all of the latter. Dr. Barclay does not appear to us to do quite full justice to therapeutical experience as of itself a basis for legitimate induction. "Empirical practice," says he (p. 35), "appeals to no laws, is guided by no analogies, rests on no principles, but simply asserts that experience teaches the benefit of the plan proposed. On no better grounds rests the ordinary saline treatment of fevers, &c."

We would hold that no better ground can be asked for on behalf of this or any other treatment, when it is shown that experience, carefully weighed, really does teach the benefit of it. That is the great question; its explanation comes afterwards. When that is simple, and obviously included in our knowledge of laws before ascertained, as in the case of chemical antidotes to definite poisons, all is rational as well as experimental. But who does not know that nine-tenths of what is really valuable in medicine was first discovered, often by accident, and, if explained at all, this followed

long since? How much is owing, at last, to what Dr. Barclay calls "deductive reasoning" upon physiological or bare pathological facts? Perhaps enough, and no more, to prevent our adopting altogether the maxim ascribed to Trousseau, that "rationalism in medicine conducts only to absurdities." Dr. Barclay must, however, be credited with a full exposition of the application of direct observation and experiment in therapeutics, in the instances of the cure of ague by bark and its preparations, and of vaccination.

The most valuable as well as the larger part of the volume before us is occupied with examples of fallacious reasoning upon special medical or collateral subjects. Even reports made upon returns given to the British Medical Association appear to be open to animadversion on this ground. To the first of these therapeutical inquiries the name of Prof. Bennett, of Edinburgh, is attached.

"The reporter on acute pneumonia is well known to have expressed very decided opinions on the treatment of this disease. He even goes so far as to say that it is reasonable to conclude that the difference in the mortality between his own cases observed in Edinburgh and those of M. Louis in Paris 'was owing to the treatment, and that such is a legitimate application of statistics.' We may well ask what the numbers were which gave such remarkable evidence; they are 65 on one side of the Channel, and 75 on the other! In reply to this argument it is only necessary to cite the experience of other observers who have had a very much smaller mortality than Dr. Bennett; for surely he is in all fairness bound to admit that a man who only loses one patient in 60, or another who has actually only one death among 90 recorded cases, must have discovered a mode of treatment better than his own. Statements to this effect are made by a writer who has collected the largest number of statistics which I have met with on the subject; and it is very remarkable that though the cases just referred to are included among those in which venesection was not practised, yet the statistics fail in showing the advantage of abstaining from bleeding in pneumonia. . . . . The cases in which bloodletting formed one part of the treatment gave a death-rate of 164 in the thousand; while 10,000 cases treated almost entirely without venesection gave a death-rate of 203 in the thousand, not including the army statistics, which give only a death-rate of 39 per thousand during twenty years, when moderate bleeding was the rule of practice." (p. 49.)

Another therapeutical inquiry of the same Association is alluded to, in regard to the treatment of tape-worm by the oil of male fern. It is remarked that while no doubt can exist, upon inductive evidence, that this remedy will generally expel the parasite, statistics might have been made, with more advantage, to prove its *comparative* efficacy; whether it or kousso, for example, fails most or least frequently. Moreover, some light might thus have been thrown upon the causes of its failure in certain cases.

The treatment of non-syphilitic psoriasis, and that of scarlatina, as considered in other similar reports, are not regarded by our author as having been thereby greatly elucidated as yet; although the latter may gain somewhat of importance hereafter by the extension of the inquiry to a large series of cases.

The recent doctrine of "syphilization" is well contrasted by Dr. Barclay with that of vaccination; the latter affording a splendid example of successful induction, the former of futile hypothesis. As the preventive action of vaccination harmonized well with other known facts, and was itself suggested by observed instances, it needed but a few experiments to afford it a demonstrative support; while syphilitic inoculation as a conservative measure, finding no clear analogy, nor positive fact to father it, must die

almost stillborn, after a few failures, notwithstanding some promising coincidences. A similar fate, too, belongs to the idea of the use of belladonna as a prophylactic for scarlet fever, and of sarracenia as a cure for smallpox.

Acute rheumatism has been subjected to more experimentation, as well as hypothesis, than most maladies; though as yet without wholly satisfactory results. The same is remarked of pulmonary consumption. Dr. Churchill's method of treatment by the hypophosphites is "ruled out" by our author, we think very properly; valid evidence not having been afforded of its efficacy. For this, two series of cases should have been taken, as nearly alike as possible on all variable points; one set having employed the remedy under trial, and the other not. The number of deaths, in a term of years, in each series, and the number of recoveries, might give us some definite estimate of the value of the medication proposed.

Cholera has also been made the subject of many experiments, rational or irrational in their suggestion; often purely empirical. The investigations made by authority of the London Board of Health and Royal College of Physicians, as embodied in the report of Drs. Baly and Gull, appear to show that, urgent as are the claims of many for particular modes of treatment, "no induction has yet been established, indicating that any remedy possesses curative powers in cholera."

Dr. Barclay goes beyond his own rules of strict evidence in asserting without qualification (p. 94) that cholera is a disorder "derived more or less directly from another individual whose tissues have been similarly diseased." Further on in the volume he resumes the topic of the etiology of this disease, as illustrating inductive principles (p. 107). Dr. Baly's only generalization was that cholera is propagated by human intercourse, and that certain unknown causes aid or limit its transmission to particular persons. This our author calls "an empirical law." He adds that Dr. Snow's hypothesis in regard to the nearly universal transmission of the morbid element through drinking-water was essentially limited by facts brought to bear against it by Dr. Baly and others, showing that such is only *one* of the modifying influences affecting cholera. Dr. Barclay overlooks a larger generalization, first distinctly enunciated in this country,[1] which includes *all* of those influences, leaving as unknown only the specific morbid cause which gives to this epidemic its entity. This is, that *animal decomposition*, in any and every form, is the great *promotive* cause of cholera; acting only with the migratory specific cause, but determining, as to that, its direction and extent of propagation.

Dr. Todd's "supporting treatment," as applied by him, in theory at least, to all acute diseases, is well commented upon in the work before us. It is shown that a series of fallacies is woven through the whole argument on behalf of that theory and practice. Were it even granted that support is in all disease the most important indication, it does not follow at all that alcohol must be preferred for giving that support; nor is its use in such a mode, beyond what all practitioners have long agreed upon in certain cases, proved, by Dr. Todd's own statistics, to deserve confidence. As quoted by Dr. Barclay, of eighteen of his cases of rheumatic fever, fifteen are reported as having cardiac complication; and of continued fever, in twenty-four recorded cases, fully stimulated, eleven were fatal.

"In therapeutics," as our author says, "fallacies, from the misapplica-

[1] Philada. Medical Examiner, Aug. 1855; cited in British and Foreign Medico-Chirurgical Review, Jan. 1857, p. 62.

tion of the inductive method of reasoning, are very numerous." Perhaps there is something saddening in the view given in such a work of the great prevalence of medical errors. But it is a satisfaction at least to know that the profession is well awakened to the need, for its uses, of a positive science. The task now most pressing, for clinical observers, appears to be, to show that such positive science is possible; that facts in the action of remedies, in the modification of disease, are just as truly and substantially facts as those of chemistry, normal physiology, or vivisection; and that they may be relied upon, when well established, for that which we all yet hopefully labour for, however slow its progress—a really inductive science of medicine. H. H.

ART. XXII.—*Medico-Chirurgical Transactions.* Published by the Royal Medical and Chirurgical Society of London. Second series. Volume the twenty-ninth. 8vo. pp. 447. London, 1864.

THIS volume contains twenty-four original communications. As abstracts of fourteen of these have been given in the numbers of this Journal for last year, we shall devote attention mainly to the other papers.

I. *A case of cancerous infiltration of the penis, with cancerous ulcer of the bladder, and secondary deposits in the lungs, bones, and other parts of the body.* By HOLMES COOTE, F.R.C.S., &c.

A short abstract of this case is published in the number of this Journal for January, 1864. It is a remarkable case, on account of the rarity of true infiltrated scirrhus elsewhere than in the mammary gland.

II. *Case of a mucous cyst on the laryngeal aspect of the epiglottis successfully treated by incision.* By ARTHUR E. DURHAM, F.R.C.S. Communicated by JOHN BIRKETT.

An abstract of this case is published in the number of this Journal for January, 1864. It may be added that the patient's difficulty of swallowing was first experienced immediately after a severe attack of sore throat, under which he had suffered two years previously to undergoing the operation by which he was so instantaneously relieved.

III. *Case of unusual difficulty in lithotomy arising from great distortion of the pelvis by rickets.* By HENRY THOMPSON, with a note by JOHN ERICHSEN, Esq.

This case is that of a boy, aged 4½ years, from whose bladder, by the median operation of lithotomy, a stone was removed one and one-eighth inch in length, seven-eighths of an inch in breadth, and five-eighths of an inch in thickness. On the third day the patient died, after the usual symptoms of peritonitis.

At the post-mortem examination the upper outlet of the pelvis was seen to present an irregular heart-shaped figure, obliquely cordate; the sacral promontory approached within three-eighths of an inch of the left pubic ramus, within barely five-eighths of the right, and barely seven-eighths of the symphysis pubis. These measurements are those of the dried bones.

Mr. Erichsen's note relates the operation performed by him some ten weeks previously upon this patient, when finding that the calculus could not be extracted in the usual way by ordinary instruments, and that it was too

hard to be broken up by the forceps and extracted piecemeal, he thought it prudent to desist.

A plate accompanies this paper representing the pelvis of the patient and the stone extracted.

IV. *Account of some unusual occurrences during the cure of a popliteal aneurism.* By CHARLES H. MOORE.

V. *Case of popliteal aneurism successfully treated by flexion of the knee.* By ARTHUR E. DURHAM.

VI. *Some particulars of a case of popliteal aneurism cured by flexion of the knee.* By the late H. C. JOHNSON, narrated by ERNEST HART. (Communicated by John Birkett.)

VII. *Note on the application of indices to aneurismal clamps and other pressure instruments.* By ERNEST HART. (Communicated by John Birkett.)

XVII. *Account of a case of aneurism of the abdominal aorta which was cured by compression of that artery immediately above the tumour.* By WILLIAM MURRAY, M.D.

XIV. *On a new method of procuring the consolidation of fibrin in certain incurable aneurisms.* By C. H. MOORE. *With the report of a case in which an aneurism of the ascending aorta was treated by the insertion of wire.* By CHARLES MURCHISON, M.D.

VIII. *Clinical observations illustrating the effects produced by the implication of branches of the pneumogastric nerve in aneurismal tumours.* By S. O. HABERSHON, M.D.

These seven papers are placed together in order to facilitate their consideration.

In Mr. Moore's case the aneurism was in the calf, under cover of the highest part of the gastrocnemius. Flexion of the knee was first employed, and continued for eight days; it was then abandoned on account of the pain it produced along the posterior tibial nerve. Any position of the knee which influenced the beat of the aneurism eventually produced insufferable torture in the sole of the foot. The mode by which the knee was flexed is not given. For seven weeks instrumental compression was employed, two tourniquets being used, one over the artery in the groin and the other on the thigh; effective pressure was made by them for from ten to fourteen hours a day. By digital compression the pulsation in the aneurism was finally arrested. In the course of the treatment, iodide of potassium was administered for eighteen days, one and a half ounces being taken. The effect of the drug appears to have been to increase the frequency of the arterial pulsations, and consequently the tension of the tumour.

In Mr. Durham's case the tumour was situated rather in the upper part of the right popliteal space. Here flexion of the knee succeeded perfectly. On examination on the fourth day from the fair commencement of the treatment, no pulsation was felt in the tumour. Severe pain was felt only for the first two days of the treatment. At the beginning the knee was bent as far as was deemed expedient, and the foot placed in a kind of slipper, which was attached by a heel-strap to broad bands passed round the thigh and pelvis. This is the plan recommended by Mr. Spence, in the *Edinburgh Medical Journal* for November, 1858. So much pain was caused by this that it was discarded before the expiration of twenty-four hours, and the plan recommended by Mr. Hart adopted. The limb was bandaged from the toes to within a short distance of the knee and carefully flexed. A large pad of cotton wool was placed over the aneurism

and in the flexure of the joint, and the roller was then carried round the thigh. The thigh was, of course, flexed on the pelvis, and the whole limb supported by pillows. Every day the flexion was slightly increased, a fresh roller being placed over those already applied, which were not interfered with.

In Mr. Johnson's case, narrated by Mr. Hart, flexion of the knee in the way just related was successful in producing consolidation of the tumour at the end of six days. Pressure by the tourniquets had been tried, ineffectually, for nearly three months, and Mr. Johnson was on the point of ligating the femoral artery, when flexion of the knee was fortunately suggested. We regret that the exact situation of the tumour, in this case, is not stated, as this must have considerable influence upon the success of the method. Flexion of the knee has been successful in at least thirteen cases, treated by British surgeons, since 1858.

Mr. Hart describes an aneurismal instrument he has had made, and of which he appends a woodcut, where the pressure is registered by a needle on a scale. It is effected by a strong spring, which affords an elastic pressure capable of nice graduation from four to twenty pounds. The instrument has already been tested in practice, and works well. The application of indices to instruments for curing aneurism by pressure is likely to obviate much of the difficulty attending instrumental compression and to remove some of the principal causes of failure.

The case of aneurism reported by Dr. William Murray, of Newcastle-on-Tyne, is one of the most extraordinary on record. The patient (Mark Wilson) was a spare man, twenty-six years old, whose symptoms first showed themselves after a hard day's work nearly a year before Dr. Murray saw him. His condition then was as follows:—

"His abdomen is somewhat spare, so that a distinct pulsation can be seen to the left of and slightly above the umbilicus; the pulsation is most distinct during expiration. On applying the hand, a hard, slightly movable pulsating mass, of a distinct globular form, is to be felt extending from about two inches to the left to about one inch to the right of the umbilicus, and upwards to within three inches of the margin of the left lower ribs. The pulsations in it are very strong, and impinge upon the hand with a sudden stroke, and the expansion of the tumour very distinctly separates the hands when applied to it. The tumour is of about the size of a very large orange. The impulse conveyed to the hand, when laid on the upper part of the tumour, is almost as strong upwards as it is downwards, when felt by the hand applied below the tumour. When pressure is made on the aorta above it all pulsation ceases, and when the pressure is removed a distinct thrill is felt to accompany the rush of blood into the tumour. A line drawn across the abdomen over the umbilicus touches at either end the margins of the last ribs, and incloses between the free borders of the ribs a triangular space (the epigastric region); over the left half of this space there is room enough to compress the aorta against the spine. The aorta below the tumour can be felt, and its pulsations seem in no way to vary from their normal character. By auscultation a feeble bruit can be heard over the tumour. The patient is in good general health; his bowels are subject to occasional attacks of constipation, sometimes being open every day, at others only once in two or three days, which may to a certain extent be accounted for by the large quantity of opiates he has taken to relieve the acute pain which he has suffered. His arterial system is free from evidence of degeneration."

The man was examined by a large number of medical men, and by all of them the diagnosis of aneurism of the aorta was verified.

All palliative treatment having failed to afford relief, Dr. Murray determined to apply a tourniquet above the tumour, and thus attempt to

cure it by compression. An ordinary horseshoe tourniquet, made so as to open rather wider than usual, and thus to grasp the trunk of the body, was found when accurately applied to stop pulsation in the aneurism. Dr. Murray thus relates his proceedings :—

"On Saturday, April 16th, the patient was put under chloroform. (Having lately administered chloroform to a patient for fifteen hours without any apparent injury, I had no hesitation in making a prolonged use of it in this case.) The anæsthetic influence was accordingly kept up for two hours, during which time, except during momentary displacements of the instrument, the pulsation in the aneurism and in the vessels of the lower limbs was completely arrested. On removing the pressure no visible effect had been produced; but he passed no urine for nearly thirty hours. It was found exceedingly difficult to keep up steady pressure, as the patient, being under chloroform, unconsciously moved about a good deal; the irregular action of the muscles of expiration in the abdominal wall added very much to the difficulty, and it became necessary to sit constantly with one hand on the screw of the tourniquet and the other on its anterior or applied blade, and thus to secure the constant pressure required. On neither occasion when the pressure was applied did we escape a considerable number of recurrences of the pulsation from displacements of the instrument. This statement, however, does not apply to the last hour of the second and successful attempt, during which all movement and pulsation were completely arrested.

"On Tuesday, April 19th, after much entreaty on my part, the patient again submitted to be put under chloroform. Dr. Heath having carefully re-examined the tumour, and expressed his conviction of the nature of the disease, the tourniquet was applied, and pulsation in the tumour completely arrested. With the assistance of Drs. Nesham and Spencer, and Messrs. Armstrong and Powell, the pressure and the insensibility were kept up for about five hours. Until the last hour the slightest movement in the tourniquet showed that pulsation in the tumour had not ceased, and that the disease was unaltered. During the last hour the existence of pulsation became less obvious. It was then deemed prudent, lest the patient's strength should be exhausted, to remove the pressure and see what had been accomplished. On finally removing the pressure very slight pulsations were felt, and hopes were entertained that some advantage had been gained. As the femorals did not beat during the application of pressure, the extremities had become cold; and when the patient recovered from the chloroform a fit of shivering occurred. Hot bottles were applied to the feet, and hot brandy and water was given, followed in a short time by a large dose of a mixture of chlorodyne, opium, and belladonna, containing about ʒiss of the tincture of the last drug, which I find is a perfectly safe dose as an anodyne when combined with an ordinary dose of opium. In the evening he was found restless, and 'sore all over,' with tenderness at the seat of the aneurism and of the pressure, and numbness of the extremities. To my astonishment the tumour was perfectly pulseless, and every indication of pulsation in the aorta below it had disappeared.

"*Wednesday, April 20th.*—Patient feels restless and slightly feverish, with thirst and hot skin, but the pulse is only 72 and feeble. Bowels open, passes water freely; can stand, although the legs are still numb, and he feels 'pins and needles' in his feet. In consultation with Dr. Heath, a most careful examination was made, and the following observations were confirmed by that gentleman. There is no pulsation in the tumour, which is now perfectly stationary, hard, resistant, and lessened in size. Nor are any pulsations to be felt in the aorta below the tumour, in the iliacs, or in the femoral arteries.

"*Thursday, April 21st.*—Patient looks well and feels much better; says he is more free from pain than he has been for several months. There is a very slight movement in the tumour, which is now a hard globular mass, easily felt, and slightly movable, but evidently smaller than before. At one or two points on the abdominal wall pulsating vessels can be felt, but there is no pulsation in the femorals.

"*Friday*, 22*d*.—With Mr. Lightfoot, who carefully examined the case, the following points were made out and verified by that gentleman: A solid hard tumour, about the size of an apple, lying to the left of the umbilicus, can be felt, and during deep expiration can be seen. It is motionless to the eye, and by the hand the slightest possible forward movement can be distinguished at its upper border, as if communicated from the aorta pulsating above. No expansion, thrill, or bruit, can be made out. Running over the right border of the tumour a vessel can be felt pulsating, which, from its position and size, is probably the superior mesenteric artery. The femorals are pulseless. All numbness is gone from the legs, and the patient declares he feels quite well.

"*Saturday*, 23*d*.—Observation of the tumour corresponds with the notes of yesterday in every particular. The pulsation of small arteries in the abdominal wall is now pretty distinct. The patient is sitting up and out of bed, feels better than he has done for months past, and is free from pain. Eats well and sleeps well.

"*Sunday*, 24*th*.—Going on well.

"*Monday*, 25*th*.—Still improving, and is moving about freely. The tumour is now much diminished in size, and no pulsation can be distinguished. (Observation confirmed by Dr. Spencer.)

"*Tuesday*, 26*th*.—The patient has been out this morning, and walked about a quarter of a mile. On ceasing to walk he felt as if a cord was tied around his waist, and was quite numb below that level. He feels his legs numb and weak, but in other respects is quite well and in good spirits, declaring himself to be better than he has been 'for eleven months past.' After careful examinations, the observations previously made were this morning confirmed by Messrs. Fife and Armstrong. Mr. Rayne, after a very careful examination, also expressed his conviction 'that there is now no blood passing through the tumour.' Dr. Gibb and many other medical gentlemen in the town, after examining the parts, came to a similar conclusion.

"*May* 1*st*.—Patient still improving. Legs warm and stronger, but still numb when he walks far. Had an attack of diarrhœa, which ceased on taking a few doses of chalk mixture. No pulsation in the tumour or arteries below it.

"5*th*.—Still improving. Took a long walk two days ago, and, except a feeling of numbness and weakness in the legs, was no worse for it. Tumour carefully examined this morning in the presence of several medical men, when the following points were observed and verified: 'The tumour is stationary, harder than before, and lessened in size. Its periphery lies seven inches from the sternum (the patient having a long chest) and five inches above the pubes, four inches from the anterior superior spine of ilium on the left side, and five inches from the same point on the right side. It lies a little more to the left than to the right of the umbilicus.' No bruit can be heard, and the aorta above can be felt beating in the epigastrium.

"11*th*.—Patient still improving, tumour pulseless, and diminishing in size."

A postscript, dated September 26, 1864, states that the man is working as an engine-fitter from 6 A.M. till 8, and sometimes 10 P.M., in addition to which he has to walk nearly two miles to and from his work. Five months had elapsed since pulsation was felt in the tumour. There was distinct pulsation in the right femoral artery, but no certain evidence of it in the left.

Full abstracts of the paper of Mr. Moore, with the case related by Dr. Murchison, and of that of Dr. Habershon, are published in the numbers of this Journal for July and April, 1864. Dr. Habershon, in his observations upon the effects produced by the implication of branches of the pneumogastric nerve in aneurismal tumours, says that he has never witnessed marked gastric symptoms from aneurismal disease of the thoracic aorta (page 51). We had under our care from November, 1863, to April, 1865, a gentleman, aged 45, by occupation a shipping-merchant, with the most distressing and obstinate symptoms of dyspepsia we ever witnessed, except

in organic disease of the stomach. He said he had been dyspeptic for twelve years at least. The most remarkable phenomenon was the constant eructation of gas, which often prevented sleep for many nights in succession. This gentleman frequently passed the whole night standing and leaning against a wall, and now and then "losing himself" from complete exhaustion. He thought that in this position the gas came up more readily. All the remedies we tried, and they were numerous, failed to give relief. As some interference with the pneumogastric nerve was supposed to be, possibly, at the bottom of all the trouble, an examination was made on several occasions of the condition of the aorta, but nothing abnormal was detected. The last time was only a few weeks anterior to his death, after the perusal of the work of Tufnell, noticed in the April number of the Journal. About twelve months before his death he effected an insurance upon his life for five thousand dollars, when, of course, the examining physician to the company must have failed to detect anything abnormal in the aorta. For some three or four months previous to his death, dyspnœa manifested itself as a prominent symptom. He died suddenly in the night, blood gushing from his mouth, and on examination we found dilatation of the cross of the aorta, which had become so thin where it is alongside of the left bronchus, as to have burst into it. There was no blood in the cavity of the chest. *There was no disease found in the stomach;* all the symptoms of dyspepsia must have been caused by the implication of the left pneumogastric nerve in the aneurismal tumour. We have related this case, as the experience of Dr. Habershon, recorded in this paper, might increase the difficulty of making the diagnosis in these exceedingly difficult cases of internal aneurism.

IX. *On the endemic hæmaturia of the Cape of Good Hope.* By JOHN HARLEY, M. D. (Communicated by Dr. Lionel S. Beale.)

An abstract of this interesting paper, together with the very important remarks made by Dr. Cobbold on the occasion of its reading before the Society, is published in the number of this Journal for April, 1864. Two plates accompany the paper representing the parasite in various stages of development.

X. *Some account of the amputations performed at St. Bartholomew's Hospital, from the 1st January, 1853, to the 1st October, 1863.* By GEORGE WILLIAM CALLENDER.

An abstract of this communication is published in the April number of this Journal for 1864.

XI. *A case of strangulated femoral rupture, where, on a former occasion, the neck had been torn from the body of the sac, in the taxis, and the escaping bowel had formed a subperitoneal pouch, which finally attained an extraordinary size.* By J. W. HULKE.

In the XLII. volume of the Transactions is a paper by JOHN BIRKETT, of which an abstract is given in the number of this Journal for April, 1860, upon certain cases of hernia, some of which resemble greatly the one here related. The anatomical condition of the parts, as found at the *post-mortem* examination in Mr. Hulke's case, is represented by two wood-cuts.

XII. *On the absorption of dead bone.* By WILLIAM SCOVELL SAVORY.

A short abstract of this paper, together with a report of the remarks made in the Society on the occasion of its reading, is published in the number of this Journal for July, 1864.

Mr. Savory's experiments prove that pegs, made out of the compact substance of the shaft of the human femur, when driven *tightly* into the bone of an animal, and left there for some weeks, are found to have dimin-

ished in their weight, and in some, at least, of the experiments described, the portion that disappeared could not have escaped externally.

XIII. *On a new operation for obtaining union of ununited fracture, with remarks on its application to certain cases of recent fracture.* By E. R. BICKERSTETT, Esq. (Communicated by Dr. Murchison.)

An abstract of this paper, together with the remarks made by Fergusson, Coote, and Barwell, on the occasion of its communication to the Society, is published in the number of this Journal for July, 1864. It is one of the most important papers in the volume, and the method indicated therein for fixing, in a desirable position, fragments of broken bone will, we doubt not, be extensively adopted. The bone-drill, described in the preceding number of this Journal (April, 1865) by Dr. B. Howard, would afford great assistance in practising the operation. This communication is illustrated by three wood-cuts and two lithographic plates.

XV. *Two cases of stone in the bladder of the female treated by rapid urethral dilatation, with remarks on the operation.* By THOMAS BRYANT.

An abstract of this interesting paper, together with some very valuable observations made after its reading before the Society by Mr. Henry Thompson, is published in the number of this Journal for July, 1864.

XVI. *Statistics of Queen Charlotte's Lying-in Hospital.* By GEORGE B. BRODIE, M. D. (Communicated by Charles Hawkins.)

A full abstract of this paper, together with the remarks made at the time of its communication to the Society by Drs. Webster and Mackenzie, is published in the number of this Journal for July, 1864.

XVIII. *Case of congenital imperfection of the mammæ, sexual organs, sternum, and heart, in a woman aged twenty-two years.* By EDWARD HEADLAM GREENHOW, M. D.

This communication gives an account of an unmarried woman, a servant, 22 years of age, who, when examined, was found to have a considerable depression of the sternum, no discoverable trace of mammary glands, an irregular action of the heart, and a condition of the genital organs which is thus described:—

"Mons veneris very slightly prominent, has very scanty covering of hair; skin very fair on these parts. Clitoris and nymphæ present and of normal size. Hymen and vestibule very vascular; the opening through it admits with difficulty the index finger. Vagina very narrow, admits two and three-quarter inches of index finger. No os uteri found projecting into vagina, although there is one spot the size of top of index finger which feels thickened. On pressing firmly against the vaginal cul-de-sac no cervix of the uterus, nor anything like ovaries or other solid matter, can be felt beyond it. No orifice can be detected by the touch at the thickened point. No examination by speculum was made, as the vagina was much too narrow for such a mode of inquiry. On examination per rectum there appears to be a uterus, that is to say, a solid body is felt on pressing against the anterior wall of the rectum, but this body is smaller and much less distinct than an ordinary uterus, and nothing resembling ovaries could be discovered."

Dr. Greenhow has been able to find only four cases on record in any respect similar to this one.

The main points of interest in this case are to be determined only by examination of the body, after the death of the woman.

A wood-cut, in this communication, represents the anterior face of the thorax, to show the absence of mammary glands.

XIX. *Pathological researches into the diseases of the ear.* (Supple-

ment to the seventh series.) *Sebaceous tumours in the external auditory meatus.* By JOSEPH TOYNBEE.

In the forty-fourth volume of the *Transactions*, reviewed in the number of this Journal for April, 1862, is a paper by Mr. Toynbee, giving an account of a number of cases of sebaceous tumours developed in the external auditory apparatus. In several of them caries of the petrous bone had occurred; in one, abscess in the cerebrum, and in another abscess of the cerebellum had taken place.

In the present communication two cases are related where a sebaceous tumour had caused caries of the petrous bone, terminating fatally, from the effects of inflammation caused within the cranium. The subject is one very little known, and, at the same time, of great importance. The peculiarly insidious manner in which sebaceous tumours make progress, often, indeed, scarcely betraying their existence until the appearance of severe, frequently fatal, cerebral symptoms, demands careful consideration, and should lead to a thorough examination of the ear when the slightest symptoms of irritation in the meatus are complained of.

XX. *On the condition of the stomach and intestines in scarlatina.* By SAMUEL FENWICK, M. D.

A full abstract of this important paper together with observations made by Dr. Wilson Fox, at the time of its reading before the Society, is published in the number of this Journal for October, 1864.

This communication is illustrated by three handsome lithographic plates, one of which is coloured.

XXI. *On the origin, structure, and mode of development of the cystic tumours of the ovary.* By WILSON FOX, M. D.

A very concise abstract of this very interesting paper is published in the number of this Journal for October, 1864. The paper is one of very considerable length, occupying over sixty pages of this volume, and is by far the most important contribution yet made to the pathology of a class of affections, to the treatment of which so much attention has been paid of recent years.

This communication is illustrated by three large lithographic plates containing forty-two figures.

XXII. *A successful case of paracentesis capitis.* By THOMAS YOUNG THOMPSON. (Communicated by Dr. Fuller.)

The patient in this case was a male child, born of healthy parents, without any tubercular history. When fourteen days old, he sustained a fall, apparently without any ill effects, but at the end of three weeks a protuberance appeared on the crown of the head, at first circumscribed, but gradually becoming diffused. The head then began slowly to enlarge, and continued to do so, notwithstanding local and general treatment, followed for ten months. The head then measured, circularly, twenty-four and a half inches, and laterally twenty-four and a quarter; it increased at the rate of an inch in two weeks.

About ten ounces of a colourless liquid were withdrawn, through an opening made by a trocar, of crow-quill size, passed through the coronal suture, an inch and a half from the anterior fontanelle. The head was then firmly encircled in broad strips of adhesive plaster. The fluid continued to flow for some twenty-four hours, and a few ounces thus escaped.

On the seventh day fresh strips of plaster were applied. Convulsive symptoms, lasting for two hours, occurred on the tenth day.

Forty days after this operation the head appeared to be nearly as large

as before. Four ounces of fluid, this time milky and of the consistency of weak gum-water, were withdrawn, in the same way as just related. The head remained much in the same condition, and seven weeks after this second operation measured circularly twenty-two, and laterally twenty-three inches. Sea-bathing, cod-liver oil, and preparations of iron were employed.

At the age of three years the child was strong, well-nourished, and very intelligent. The whole surface of the head was firm, no soft parts could be felt: it measured circularly twenty-three and a half inches, and laterally twenty-three.

It appears to us very doubtful, indeed, whether the happy result in this case was the effect of the tapping of the head.

XXIII. *On the causes of hernia.* By JOHN A. KINGDON.

A short abstract of this paper by Mr. Kingdon, who is Surgeon to the London Truss Society, is published in the number of the Journal for October, 1864. Mr. Kingdon endeavours to show: That in the normal and healthy condition of the peritoneum, the viscera in the abdomen do not come within the grasp of the power by which they are pushed outside of the cavity; and, therefore, that although the proximate cause of hernia is mechanical, the predisposing, real cause is pathological.

This communication has a certain interest, but we cannot consider that it has much practical value. The causes of hernia, so far as we can act upon the affection, are mechanical, and the contents of the abdomen come out, when pressed upon, and an opening presents itself, as Garengeot long ago expressed it, "in the same manner as dough squeezed in the hand comes out through the intervals of the fingers."

XXIV. *Report of the committee appointed by the Royal Medical and Chirurgical Society to inquire into the uses and the physiological, therapeutical, and toxical effects of chloroform, as well as into the best mode of administering it, and of obviating any ill consequences resulting from its administration.*

An abstract of this report is published in the number of this Journal for October, 1864.

The tables in the original communication are particularly worthy of study. The one marked "TABLE A. *Fatal effects of chloroform,*" contains the record of 109 cases, where death was caused by the administration of this potent agent.

There is one evil attending the administration of anæsthetics, to which we have not yet seen any attention called; this is, that operations are more apt to be performed carelessly, and by incompetent persons, than when the patient is fully alive to what is being practised upon him.

W. F. A.

BIBLIOGRAPHICAL NOTICES.

ART. XXIII.—*Military Sanitary Matters, and Statistics.*

1. *La Commission Sanitaire des Etats-Unis, son Origine, son Organization et ses Résultats, avec une Notice sur les Hôpitaux Militaires aux Etats-Unis et sur la Réforme Sanitaire dans les Armées Européennes.* Par THOMAS W. EVANS, Docteur en Médecine, etc. etc. 8vo. pp. 178. Paris, 1865.
2. *Annual Report of the Surgeon-General for the year* 1864, *made to the Governor of the State of Ohio.* 8vo. pp. 87. Columbus, Ohio, 1863.
3. *Annual Report of the Provost Marshal-General.* November 15, 1864. 8vo. pp. 49. With Five Large Tables.
4. *Report to the Western Sanitary Commission on the General Military Hospitals of St. Louis, Mo.* Presented August 1, 1862. 8vo. pp. 76. St. Louis, 1862.
5. *Report of the General Superintendent of the Philadelphia Branch of the U. S. Sanitary Commission to the Executive Committee,* January 1, 1865. 8vo. pp. 51.

THE organization of the Sanitary Commission of the United States has marked a new era in the history of the world. It is an effort of philanthropy the grandest which man has ever conceived and fully carried out. Independently of the incalculable good which it has accomplished in lessening the privations, assuaging the sufferings, and preserving the strength and lives of the soldiers, and thus promoting in the highest degree the efficiency of our armies in the field, society throughout all the loyal portion of the United States has, by its influence, been strangely modified. We refer not to the spirit of liberality which it has evoked, and which has caused an extraordinary amount of funds to be placed at the disposal of the Commission; but by its having caused the movements that were initiated by it to better the health and comfort, the physical condition generally of our soldiers, to become the leading thought of the masses, to the exclusion almost of every other, and in enlisting all classes of our citizens, directly or indirectly, in the accomplishment of its vast mission of beneficence.

Of this change Dr. Evans remarks, that he found the most convincing evidence during a voyage he made to this country for the especial object of studying the hygienic condition of the American armies, and the organization and operations of the Sanitary Commission.

"Many years having elapsed," he remarks, "since my residence in the United States, I could not but be deeply impressed by the marvellous change which I recognized in the sentiments and movements generally of society. The tastes and occupations of my former friends and acquaintances had become strangely modified. The very men who formerly were completely engrossed by the cares of business, found now abundant leisure to consecrate to the duties of a generous patriotism and noble philanthropy. The women I found no longer taken up with an interminable round of frivolous visits or fashionable parties, but more or less busily engaged in preparing for the Commission a multitude of objects to be applied by it for increasing the comfort of the soldier, when they are not to be found in the military hospitals seated, as ministering and soothing spirits, by the couch of the sick and wounded."

The beneficial influence of the United States Sanitary Commission has not been confined to our own soldiers. The doings of the Commission have attracted public attention throughout Europe, and have caused similar organizations to

be formed by more than one of the Continental governments. During the late Danio-Germanic conflict, committees of succor, organized after the exact model of our own aid associations, rendered the greatest service to both armies. The Queen of Prussia, likewise, has added to her crown a new and brilliant jewel in securing the love and gratitude of the wounded soldiers by her visits to the hospitals of Slesvig and Holstein, and by her declaration when she caused supplies to be distributed to the victims of the two conflicting armies. "In the present crisis, I neither speak nor feel as a queen, I simply express my sympathy as a female for suffering humanity."

Dr. Evans presents a brief sketch of the effort which has been made in Europe to give to the plans of relief initiated by our Sanitary Commissions a practical form. The first movement to this effect took place in Geneva, and the honour of giving to the work the primary impulse is due to J. Henry Dunant, whose name has been rendered familiar to the European public, by his generous efforts for the creation, during the Italian Campaign, of a voluntary corps of hospital attendants and overseers, and by his modest but interesting work "*Un Souvenir de Solférino.*"

On the first day of September, 1863, the Society of Public Utility of Geneva, addressed a circular to different governments, to many well-known philanthropists, and to the principal military officers of the armies of Europe, inviting their co-operation and presence at an international conference to be held at Geneva. The object of the proposed conference was "to consider the means to be employed to remedy the insufficiency of the sanitary service in armies in the field." The project was warmly received. On the 26th of October, 1863, there assembled at Geneva delegates from Russia, Austria, Prussia, and the principal Estates of Germany; from France, England, Spain, Holland, Sweden, and Switzerland. A plan of organization was definitely agreed upon, and a series of important resolutions adopted, terminated with the recommendation: "That during war entire neutrality shall be observed by the belligerent nations in respect to ambulances, their occupants, drivers, and attendants, and in respect to all hospitals, their inmates, medical officers, nurses, and servants, and also to the visitors to such hospitals, whose sole object is to administer to the wants and assuage the sufferings of the sick and wounded."

The action of the conference received the approval and encouragement of many of the European governments. The Emperor of Russia, the King of Saxony, the Grand Duke of Baden, the Royal family of Wurtemberg, Don Sebastian of Bourbon and Braganza, the Kings of Denmark and of Prussia, and the Emperor of France, have all manifested their interest in the matter, and given material aid to the fulfilment of the benevolent designs of the conference.

On the 8th of August, 1864, a second meeting was held at Geneva, and, at the same time, there was also convened there an international congress, the members of which were invested with full power to treat officially the grave questions arising out of the proposed sanitary reform in armies actually engaged in carrying on war, suggested to them by the Swiss conference. A treaty was finally concluded, and ratified by the official representatives of fifteen European governments. The provisions of this treaty cannot fail to give a new aspect, in one direction at least, to military law, and to diminish in a great degree the sufferings, if not the horrors of the field of battle.

While everything which relates to the management of the sick and wounded soldier with the view to the diminution of his sufferings, the preservation of his life and limbs, and his speedy restoration to a normal condition of health and vigour is all important, whether considered in a military, economical, or benevolent point of view, not less so are the questions which have reference to the means best adapted to preserve his physical efficiency to endure the labours and fatigues of military life, and perform the duties that may be required of him in camp, in fortification, or on the field. Primary among these questions is that of diet. The great requisites in a soldier's diet when in actual service, are smallness in bulk, unliability to speedy deterioration, agreeableness to the palate, the possession of sufficient nourishment, and absence of any tendency to bring on disease.

2. In the report of the Surgeon-General of Ohio, we have presented to us a very elaborate and instructive essay by Dr. J. H. Salisbury, on "Chronic Diarrhœa and its Complications," in which are contained some most interesting observations on diet as a cause of these abnormal conditions, and in their treatment, with the suggestion of a new army ration as a preventive of camp diarrhœa and its concomitant diseases.

Dr. Salisbury remarks that the diseases arising in the soldier from too exclusive a confinement to a diet composed of any one kind of food are far more numerous than has been heretofore supposed. It has been long known that the too exclusive use of salted meat tends to the production of a scorbutic condition. More recently it has been shown that fresh meats also, under similar circumstances, produce the same morbid state. The scorbutic diathesis thus established is best counteracted by a free use of vegetable food and the vegetable-acid salts of potassa and iron. To the list of scorbutic producers Dr. Salisbury now adds, the too large and exclusive consumption of *vegetable* food, especially that of an *amylaceous* and *leguminous* nature. This he pronounces to be in an eminent degree a scorbutic excitant. The morbid conditions to which it gives rise are, however, it is remarked of a peculiar type, differing in many particulars from those produced by animal food, salted or fresh. When the scorbutic taint results from the too exclusive use of amylaceous and leguminous food, it is best treated, not alone by the free use of vegetables and the vegetable-acid salts of potassa and iron, but requires in conjunction with the latter *albuminous animal food.*

The abnormal states produced by too exclusive a use of flesh are chiefly shown in the mouth and skin. The blood becomes thin, with little or no tendency to the formation of fibrinous deposits; whereas the scorbutic taint resulting from a diet too exclusively amylaceous, exhibits itself first in a deranged condition of the alimentary canal and nervous system, with a remarkable tendency to fibrinous depositions in the heart and lungs. Both forms of scorbutus are often attended in their course by pains and soreness of the extremities and back, simulating the sufferings from chronic muscular rheumatism.

According to the experience of Dr. Salisbury, the chief of the diseases peculiar to the army, and which have not been found amenable in any extent to the same treatment which has been found the most successful in apparently similar diseases occurring in civil practice, are referable to certain abnormal states induced by insufficient and imperfect alimentation and fermentative conditions, with a peculiar scorbutic taint developed by a diet too exclusively amylaceous. In this group of diseases incident to the army may be placed, *chronic diarrhœa; paralytic conditions, fibrinous depositions in the heart and pulmonary vessels, tendency to tuberculosis, loss of voice, so-called muscular rheumatism, and various affections of the eye and ear.*

It would be by no means unprofitable to follow the author in his exposition of the facts and observations upon which he predicates his peculiar views in respect to the effects upon health of a too exclusive diet of amylaceous food, and the class of diseases thereby induced, we must content ourselves, however, with the presentation only of Dr. Salisbury's general conclusions in his own words.

"1. Vegetable food, and especially that of an amylaceous and leguminous character, when too exclusively and continuously used, produces fermentative and scorbutic conditions.

"2. These conditions show themselves in the following abnormal states, viz., the formation of fibrinous masses (*embolia*) in the capillary vessels of sensitive, irritated, and irritable parts, resulting in congestions, inflammations, diarrhœa, paralytic tendencies, loss of voice, and diseases of the eye and ear, with pains and aches in the extremities and back, and also a disposition to morbid cell development, from which result tubercular depositions in the lungs.

"3. The abnormal conditions excited by an amylaceous and leguminous diet require as dietetic and remedial means, albuminous animal food, instead of vegetables, with antifermentives for controlling zumotic action; in conjunction with which are indicated the vegetable salts of potassa and iron, for promoting the solution of the fibrinous clots and thinning the blood, and encouraging intestinal epithelial activity, absorption, and secretion.

"4. These conditions are developed mostly during and immediately following campaigns, where the men are confined too exclusively to an amylaceous diet.

"5. The officers who carry with them variety of food, with the means for cooking it, are exempt from this class of diseases.

"6. The first manifestation of abnormal tendencies, after beginning to feed too exclusively upon amylaceous or saccharine food, or on any of the products of its fermentation, is constipation.

"7. This constipation is soon followed by fermentative changes, and the development of intestinal gases and yeast plants in the food too long delayed in the alimentary canal.

"8. As soon as gases begin to develop in the intestinal canal, yeast plants begin to form in the alimentary matters to an abnormal extent.

"9. This development of yeast plants is evidence of the inauguration of fermentative changes in the amylaceous food.

"10. Such fermentation and development of yeast plants continue to increase till a diarrhœtic condition is produced.

"11. A peculiar gelatinous, algoid, matter—usually in little masses scattered through the feces—shows itself, to a greater or less extent, as soon as the diarrhœa commences. Generally this algoid (colloid) matter is present in direct proportion to the severity of the disease.

"12. This algoid development is not the cause of the diarrhœa, but merely the consequence of certain saccharine and fermentative conditions of the system, in which state the alimentary canal becomes a proper nidus for its development. As soon as these systemic conditions are overcome, this algoid vegetation ceases to develop, and disappears entirely from the feces. It hence may be regarded as merely the consequence, and not the cause, of certain systemic conditions. Its development appears, however, to act as a poison, and increases the intestinal lesions.

"13. The system on an amylaceous diet becomes highly saccharine and fermentative, so that even the mucous secretions often contain sugar, and pass rapidly into fermentative states, developing yeast plants.

"14. This saccharine condition is abnormal, and appears to be a peculiar type of the so-called *scorbutic taint*, and yields more readily to an albuminous diet, with anti-fermentives and the vegetable acid salts of potassa and iron, with iodine in small, frequent, and unirritating doses, than to any other dietetic and remedial means.

"15. The fermentative changes in the alimentary canal are always more active towards evening and during the night, and go on increasing from day to day.

"16. Finally, the gases and yeast plants developed, produce so much intestinal irritation that diarrhœa ensues, which soon becomes chronic and not at all amenable to the treatment for ordinary diarrhœtic conditions.

"17. Accompanying the fermentative changes is always a paralytic tendency, more or less strongly marked. This is manifest in the alimentary canal, and especially in the large intestines—next in the extremities—the legs prickling and getting asleep frequently, with ringing in the ears, and a numb, mixed up, confused feeling in the head, etc.

"18. This paralytic tendency appears to arise from defective nutrition and the pressure produced by the clogging up of the capillary vessels with fibrinous masses, from which results serious congestions, &c., as in the intestinal walls, nerve centres, lungs, etc.

"19. A cough, with more or less hoarseness, usually sets in, especially during the night and on getting up in the morning, accompanied by the expectoration of a thick, sweetish, cream-coloured mucus.

"20. This is followed by more or less constriction in breathing, with frequently palpitation of the heart on any excitement.

"21. In this condition of the system there is usually a remarkable tendency to fibrinous depositions in the heart (*thrombosis*), and to the clogging up of the pulmonary vessels with fibrinous masses (*embolia*), with tubercular tendencies, and pains and aches in the extremities and back, simulating muscular rheumatism.

"22. The disease, so fatal in animals, known as 'hog cholera,' is the same ab-

normal state of the system as the chronic diarrhœa of armies, both arising from the same cause, viz., the too exclusive feeding upon amylaceous or saccharine food, or upon the products of their fermentation.

"23. The primary lesion appears to be the clotting of the blood or the aggregation of fibrinous masses in the capillary vessels and heart.

"24. There is a strong probability that the conditions of the system, which result in diabetes, are similar to those producing chronic diarrhœa. There is also evidence, that the conditions of the system which result in bronchocele, are similar to those which give rise to chronic diarrhœa; the former disease occurring in persons habitually subsisting from infancy on a diet too exclusively vegetable and amylaceous, while the latter has its origin in the too exclusive use of the same kind of food at any period of life, by those whose system has been previously accustomed to a mixed animal and vegetable diet.

"25. There is strong evidence, also, that the condition of the system which gives rise to summer complaints and fluxes in children, especially those in which the stools are gelatinous (*colloid*), and green (*the so-called colloid matter*) is similar to that which results in chronic diarrhœa. It appears to be caused by the too exclusive and continued use of starchy and saccharine substances and fruits, in which children are largely indulged.

"26. The colloid matter of chronic diarrhœa appears to be algoid, belonging to some of the lowest vegetable forms.

"27. This algoid matter is not the cause of chronic diarrhœa, but merely the consequence of certain glycogenic conditions of the system, brought on by feeding too exclusively upon amylaceous food. After it begins to develop in the alimentary canal, it tends to exhaust the system and aggravate the lesions and the disease.

"28. Sugar, vinegar, carbonic acid, and even alcoholic beverages, when too exclusively and continuously used, tend to produce a similar condition of the system with that from amylaceous food.

"29. Thus amylaceous and saccharine matters, with the products of their fermentation, when too exclusively and continuously used as food, or otherwise introduced into the system, give rise to similar lesions, and abnormal conditions, and tend to produce in the heart and capillary vessels, fibrinous depositions, which give rise to thrombosis, congestion, and hepatization of lungs, congestion, and inflammation of the intestinal walls, with damming up of the blood in the capillaries that nourish the nerve-centres and extremities, resulting in paralytic tendencies, with sometimes loss of voice and diseases of eye and ear.

"30. The above make up the great mass of the most obstinate, lingering, and fatal diseases of the army, causing a greater amount of mortality, and more suffering among the soldiers, than the casualties of the battle-field, and all other diseases incident to military life combined. Hence, if we would prevent the occurrence of these diseases, a change from the present army diet must be made."

According to Dr. Salisbury, this change is to be effected by substituting for the present army ration, *desiccated beef and vegetables*, which are, besides being sufficiently nutritive, antiscorbutic and antifermentative. They are, also, exceedingly light, and would enable the soldier to carry with him with greater ease provisions for thirty days than he can, with his present rations, provisions for five days. The substitution suggested would incur no additional expenditure. With desiccated food, the heavy and cumbersome commissary trains, that so impede the movements of an army, could also be dispensed with.

At present, as Dr. Salisbury remarks, the bulk and weight of the soldier's food consist, to a very large extent, in the water combined with his rations. This water can almost always be supplied from the springs, brooks, and rivers he meets along his line of march. In desiccated food this enormous weight of water is got rid of, while the meat and vegetables are also greatly reduced in bulk by compression. This form of food has been already submitted to a practical test, as a campaigning diet, during the Arctic expedition of Dr. Hayes, and found to answer fully as a good, nourishing, anti-fermentative and anti-scorbutic diet. In Dr. Kane's expedition this form of food was not used, and the men suffered much from scurvy and chilblains; whereas, in the expedition of Dr.

Hayes, although it penetrated to a point much further north, yet not a solitary case of scurvy nor a single chilblain occurred among the men.

Beans and peas have a decided tendency to produce indigestion, flatulence, intestinal irritation, with its intercurrent derangements. Dr. Salisbury suggests, therefore, their entire abandonment as army food.

3. In the report of the Provost-Marshal General are contained a series of most interesting statistical tables. Several of these have a value far beyond the subject of enlistments, invaliding and the mortality among soldiers in the field. They present facts which illustrate to some extent the sanitary condition of communities in time of peace and engaged in civil pursuits.

The first of the tables of general import, to which we have reference, is one showing the ratio of exemptions from military service for mental and physical infirmities, in the United States, France, Great Britain, and Belgium.

In the United States, the ratio rejected per 1000 men examined was, in 1863 and 1864, 257.02. In France, 1831 to 1833 and 1859, 317. In Great Britain, 1832 to 1851, and 1860 to 1862, 317.3. In Belgium, 1851 to 1855, 320.6.

The following table exhibits the diseases as given in the several sections of the revised regulations for causes of exemption, the whole number exempted under each section in all the States, with the ratio of exemptions per 1000 of those examined in the second draft of March, 1864. Whole number examined, 61,257.

Number of section.	Physical and mental disqualifications.	Number exempted.	Ratio per 1000.
1.	Manifest mental imbecility	181	2 95
2.	Insanity	108	1.76
3.	Epilepsy	388	6.33
4.	Paralysis, general and partial, chorea, atrophy of limbs	262	4.28
5.	Organic disease of internal organs	1512	24.68
6.	Developed tuberculosis	830	13.55
7.	Cancer, aneurism of large arteries	28	.46
8.	Inveterate and extensive disease of skin	106	1.73
9.	Permanent physical disability	1696	27.69
10.	Scrofula—secondary syphilis	265	4.33
11.	Chronic rheumatism	279	4.55
12.	Total loss of sight, cataract or loss of crystalline lens of right eye	445	7.26
13.	Partial loss of sight of the eyes—Serious permanent disease of eye or eyelids	410	6.69
14.	Total loss of nose, deformity of nose, ozæna	27	.44
15.	Decided deafness	411	6.38
16.	Disease or deformity of jaw, caries of bones of face, cleft palate	60	.98
17.	Dumbness, permanent loss of voice	11	.17
18.	Loss of tongue, diseases of tongue	5	.08
19.	Stammering	98	1.60
20.	Loss of teeth	1544	25.20
21.	Tumours or wounds of neck, fistula of larynx or trachea, torticollis	29	.47
22.	Deformed chest, curvature of spine, ribs or sternum	327	5.50
23.	Hernia	2115	34.52
24.	Diseases of rectum	152	2.48
25.	Internal hemorrhoids	203	3.31
26.	Loss of penis, epispadia and hypospodia	11	.17
27.	Incurable permanent stricture of urethra	45	.73
28.	Stone in bladder	15	.24
29.	Confirmed or malignant sarcocele, hydrocele complicated	158	2.58
30.	Loss of hand or foot	79	1.29
31.	Wounds, muscular or cutaneous contractions	495	8.41
32.	Fractures, dislocations, or anchylosis of large joints, diseases of joints or bones	1756	28.67
33.	Permanent defects of hands, loss of thumbs and fingers	295	4.82
34.	Club feet, total loss of great toe, other permanent defects or deformities of feet	305	8.24
35.	Varicose veins of inferior extremities	504	8.23
36.	Chronic ulcers	379	6 02
	Total	15,734	257.02

The following table is the ratio of rejections for mental and physical infirmities in the United States, France, Great Britain, and Belgium.

In the *United States*, the number examined was, in 1863, 255,188, of which 80,134 were exempted, or, 314.02 per 1000. In the supplementary draft in 1865, 61,257 were examined, and 15,744 exempted, being 257.02 per 1000.

In *France*, from 1831 to 1843, 2,097,876 were examined, and 680,560 exempted, or 324.4 per 1000. In 1859, 200,926 were examined, and 63,820 exempted, or 317 per 1000.

In *Great Britain*, from 1832 to 1851, and 1860 to 1862, 353,806 were examined, and 112,266 exempted, or 317.3 per 1000.

In *Belgium*, from 1851 to 1855, 201,790 were examined, and 64,696 exempted, or 320.6 per 1000.

The following are the exemptions, in every *thousand* of those examined, for certain diseases and infirmities, in the United States during 1863, in Great Britain during the years 1860 and 1861 respectively, in France from 1831 to 1843, and in Belgium from 1851 to 1855:—

For imbecility.—United States, 3.88; Great Britain, 2.20 (in 1860), .50 (in 1861); France, 00; Belgium, 1.69.

Epilepsy.—United States, 8.39; Great Britain, 00–00; France, 1.9; Belgium, .94.

Disease of brain, spinal cord, heart, and lungs.—United States, 45.35; Great Britain, 15.36 (in 1860), 27.27 (in 1861); France, 00; Belgium, 00.

Consumption.—United States, 15.00; Great Britain, 2.26 (in 1860), 5.00 (in 1861); France, 00; Belgium, 00.

Feebleness of constitution, deformed and contracted chest, curvature of spine.—United States, 44.29; Great Britain, 57.03 (in 1860), 97.45 (in 1861); France, 94.8; Belgium, 19.08.

Scrofula and syphilis.—United States, 5.16; Great Britain, 21.13 (in 1860), 28.52 (in 1861); France, 00; Belgium, 10.5.

Disease of skin.—United States, 1.92; Great Britain, 5.54 (in 1860), 8.63 (in 1861); France, 12.51; Belgium, 6.34.

Diseases of eyes, including myopia.—United States, 19.97; Great Britain, 28.75 (in 1860), 28.52 (in 1861); France, 20; Belgium, 13.08.

Disease of ears, and deafness.—United States, 7.13; Great Britain, 3.10 (in 1860), 4.51 (in 1861); France, 00; Belgium, 1.68.

Disease of nose and mouth.—United States, .51; Great Britain, .77 (in 1860), 1.63 (in 1861); France, 00; Belgium, 00.

Stammering.—United States, 1.76; Great Britain, 1.31 (in 1860), 1.63 (in 1861); France, 00; Belgium, 00.

Loss of teeth.—United States, 20.49; Great Britain, 9.52 (in 1860), 7.76 (in 1861); France, 8.5; Belgium, .26.

Hernia.—United States, 30.93; Great Britain, 11.79 (in 1860), 14.89 (in 1861); France, 24.5; Belgium, 3.99.

[The English returns exempt in 1860 6.13, and in 1861 11.76 per 1,000, for *laxity of abdominal rings*, showing tendency to hernia.]

Hæmorrhoids.—United States, 3.59; Great Britain, 5.00 (in 1860), 5.88 (in 1861); France, 00; Belgium, 00.

Varicose veins.—United States, 7.63; Great Britain, 28.63 (in 1860), 40.79 (in 1861); France, 00; Belgium, 00.

Varicocele.—United States, 3.15; Great Britain, 13.39 (in 1860), 23.52 (in 1861); France, 00; Belgium, 00.

The following tables show the average heights and ages of the recruits, substitutes, and drafted men, in certain States, for the year 1864:—

States.	Total examined.	Average height.	Average greatest height.	Average least height.
New Hampshire	2,213	5 ft. 5.73 in.	6 ft. 2.5 in.	5 ft. 0.41 in.
Vermont	148	5 " 7.62 "	6 " 0.5 "	5 " 3.5 "
Massachusetts	10,305	5 " 6.74 "	6 " 2.24 "	4 " 10.7 "
New York	12,048	5 " 5.5 "	6 " 2.39 "	4 " 11.8 "
New Jersey	13,113	5 " 6.86 "	6 " 4.5 "	4 " 8.25 "
Pennsylvania	13,269	5 " 7.08 "	6 " 3.92 "	4 " 10.42 "
Delaware	603	5 " 5 "	6 " 3 "	5 " 3 "
Maryland	6,203	5 " 5.93 "	6 " 2.75 "	4 " 9.75 "
Minnesota	3,806	5 " 5.56 "	6 " 2.75 "	4 " 7.5 "
Kentucky	849	5 " 7.02 "	6 " 4.87 "	5 " 5 "
Ohio	7,688	5 " 6.64 "	6 " 3.38 "	4 " 9.61 "
Michigan	500	5 " 8 "	6 " 4 "	4 " 3.5 "
	70,745	5 " 6.44 "	6 " 3.07 "	4 " 11.41 "

AGE.

States.	Total examined.	Average age of all examined.
New Hampshire	2,213	28.93 years.
Vermont	148	30.26 "
Massachusetts	10,316	31.27 "
New York	10,997	29.17 "
New Jersey	13,113	33.36 "
Pennsylvania	17,190	28.89 "
Delaware	1,858	28 "
Maryland	4,645	31.07 "
Minnesota	3,806	34.07 "
Kentucky	1,572	34 "
Ohio	8,179	28.96 "
Michigan	500	36 "
	74,537	30.59 "

The report of the Provost Marshal General contains many more medical statistics of very great interest prepared, as were those already noticed, by Surgeon J. H. Baxter; we shall be obliged, however, to content ourselves with the citation of the following facts in reference to the Veteran Reserve Corps, for the year 1863.

The chief disability of the officers who have been appointed or transferred to the Veteran Reserve Corps arose from gunshot wounds. Sixty-six per cent. were sufferers from this cause, in many cases the wounds being of a very serious character.

The principal disabilities among the enlisted men transferred to the Veteran Reserve Corps were gunshot wounds, chronic diarrhœa, injuries, disease of heart, rheumatism, hernia. These disabilities are here arranged in the order of their frequency. The ratio per thousand of gunshot wounds greatly exceeded that of any other disability for which the men had been transferred to the corps. It was 242.35, being nearly every fourth man. The large number of cases of disability referred simply to injuries are not included in making up this ratio. These cases, however, should be included probably among gunshot wounds. Including them, it would give a ratio of 326.72 per thousand, or nearly every third man of the Veteran Reserve Corps.

When we find that the great majority of disabled soldiers discharged from service are dismissed on account of disease, it becomes a matter of surprise that the ratio of gunshot wounds is so much in excess of other disabilities.

The prevalence of diarrhœa, in its several stages, in the army of the United States, during the year ending June 30, 1862, was 653.47 cases in every thousand men; it is not, therefore, surprising that the ratio of this disease, in its chronic form, among the disabilities of the Veteran Reserve Corps, should amount to 91.56 per thousand.

Disease of the heart occurs in the ratio of 69.30 per thousand, or one in 14.4. This complaint has been among the most prolific causes for the discharge of men from the service. For the first two months of 1863 the ratio per thousand, discharged for disease of the heart, was 137. By transference to lighter and less exposed duties in the Veteran Reserve Corps, it undergoes a decided modification in severity, and the soldier affected with it is able to perform all duties pertaining to his position.

Chronic rheumatism is very prevalent among our troops, and it would of course be expected that it would maintain its relative ratio among the disabilities causing a transference to the Veteran Reserve Corps; 54.44 per thousand, or less than one in every 18, is found to exist.

A large number of discharges from the service, previously to the formation of the Veteran Reserve Corps, had been of soldiers, otherwise healthy, for hernia. The ratio among the causes for which men have been transferred to the corps amounts to 40.62 per thousand, or one in every 24.6.

It has been found in many cases where soldiers have been transferred to the Veteran Reserve Corps, that by light duties and comfortable quarters they become after a time again fit for active service, when they are returned to their former position in the army.

Previously to the organization of the Veteran Reserve Corps, all the disabilities in the soldier which admit of his transfer to it would have required, under the then existing regulations, his discharge from the service. It is gratifying to know that, by the aid of the reserve corps, the faithful soldier, disabled from the more active duties of the service, can still find employment, and, instead of becoming mere pensioners upon the government, are able to perform acceptably duties which would otherwise have detained able-bodied men from their proper place in the field.

Much of interest, as well as instruction, may be gleaned from the remaining reports whose titles are prefixed to the present notice. Their contents are, in general, however, of a more local and temporary character than those we have especially noticed.

From the report on the General and Military Hospitals of St. Louis, Mo., we learn that during the ten months ending July, 1862, there were admitted into these hospitals 23,198 patients, of whom 1,826, or $7\frac{7}{8}$ per cent., died. Of the admissions, 20,005 were for sickness incident to climate, exposure, and camp life, and 3,198, or $13\frac{3}{4}$ per cent., as the result of wounds and other casualties. Of the cases of sickness, 1,593 died, or $7\frac{5}{8}$ per cent. Of the wounds and casualties, 228 died, or $7\frac{1}{8}$ per cent.

The casualties were, burns, 10 cases, no death; *concussion of brain*, 3 cases, no death; *contusion*, 157 cases, no death; *fracture*, 95 cases, 3 deaths; *frostbite*, 13 cases, no death; *hernia*, 206 cases, no death; *luxation*, 16 cases, no death; *sprains*, 26 cases, no death; *contused* and *lacerated wounds*, 44 cases, no death; *incised wounds*, 25 cases, no death; *punctured wounds* (*stabs*), 8 cases, 1 death; *gunshot wounds*, 2,537 cases, 218 deaths; *other injuries*, 52 cases, 11 deaths.

Hospital gangrene was not at all, and pyæmia rarely met with. Few suffered from *erysipelas*, and of these few the most recovered. *Tetanus* occurred in only a single case. Only 302 cases of venereal disease were encountered among the 23,198 cases.

From the same report, we derive the following common sense remarks, which we give in very nearly the author's own words. They are worthy of serious consideration on the part of all who may have charge of a military hospital.

One of the most serious difficulties our hospitals, and I presume all the hospitals in the United States, labour under, is the too frequent change of officers and employees. A familiarity with the duties to be performed facilitates dispatch, but in our hospitals, ere the officers and attendants become fully initiated into their duties they are removed to another field of action, and their places too often supplied with novices. Would it not result in more good, if persons were retained in positions for which they are found in all respects qualified during good behaviour? A surgeon in charge of an hospital or ward requires

much time to learn his routine of duties and the best means for their fulfilment, and to study properly the cases under his care; when, therefore, he is suddenly removed to another hospital, it can only be to the detriment of the patients and of the service. The same holds good in respect to nurses, cooks, and all other employees.

The system of taking convalescent soldiers for nurses or cooks, is of questionable utility. Nursing the sick is a very laborious work; only the physically and morally healthy ought to undertake it. How can an untutored soldier, just recovering from wasting disease, do justice to it? The valetudinarian needs repose at night, and active exercise in the open air during the day, but as a nurse, he has to watch during both day and night in the ward. The convalescing soldier is thus prevented from recuperating fully, and returning speedily to the field. Cooking is an art; a good cook is invaluable in camp, much more so in an hospital. Food well prepared would have saved us many a brave soldier, who, for want of it, sickened and died. Would it not be better economy, and more humane, to hire well-trained competent nurses and cooks, to keep them as long as they did their duty well and faithfully? The sick and wounded soldier would be grateful, while the convalescent would be glad to be relieved from a task for which he has neither the capacity, aptitude, nor inclination.

D. F. C.

ART. XXIV.—*The Dispensatory of the United States of America.* By GEORGE B. WOOD, M.D., President of the American Philosophical Society, President of the College of Physicians of Philadelphia, Emeritus Professor of the Theory and Practice of Medicine in the University of Pennsylvania, &c., and FRANKLIN BACHE, M.D., late Professor of Chemistry in Jefferson Medical College of Philadelphia, late Vice-President of the College of Physicians of Philadelphia, late President of the American Philosophical Society, &c. &c. Twelfth Edition, carefully revised. pp. 1704, 8vo. Philadelphia: J. B. Lippincott & Co. 1865.

THE revision of the United States Pharmacopœia in 1863 entailed the necessity of a complete revision of the United States Dispensatory, which is the great commentary upon that national work. In this light has the Dispensatory been regarded during the long period of its useful and successful career, and, viewing the works as inseparably connected, it may be said that the joint issue of the two has constituted the decennial era in the history of the pharmacy of our country. The whole task of revising and preparing for the press this much wanted edition has fallen upon Prof. Wood, in consequence of the lamented demise of his coadjutor, Prof. Bache, who died not long after the publication of the Pharmacopœia. Indeed, we feel ourselves warranted in expressing the opinion that the death of this distinguished medical chemist was partly owing to the fatigue he underwent in preparing that work for publication. For a person at his time of life, the labour was overwhelming, and, instigated by the most conscientious feeling to perform faithfully the duties of the office of Chairman of the Publication Committee, he sacrificed more rest than was prudent in his desire to acquit himself of the obligations which he had assumed. To the memory of Dr. Bache pharmacy truly owes the tribute of gratitude, for he laboured earnestly to promote its interests during his honourable and extended lifetime. In speaking of this event in the preface, Dr. Wood feelingly states that "this deplorable loss, by which long-existing ties of friendship and joint labour have been broken, has thrown the whole responsibility upon the surviving author; and at a time, moreover, when circumstances called for an unusual exercise of judgment, and rendered necessary an extraordinary amount of labour in preparing a new edition."

The causes which have required a thorough revision of the work have been enumerated in the preface. The unprecedented length of interval which had elapsed since the last issue, the eleventh, in 1858, a delay which was caused by the unfinished state of the Pharmacopœias, was a prominent one. Besides that

of our own, which was in progress of thorough rearrangement, the three British Pharmacopœias were in course of consolidation into one. It has since been published under the title of the British Pharmacopœia. Materials entirely new had, from these causes, to be co-ordinated, and the difficulties may be appreciated from the following exposition of them. "The changes made both in our own and the British Pharmacopœias rendered indispensable similar changes in the Dispensatory. One not familiar with the subject can scarcely appreciate the constant vigilance, the unceasing attention, and the minutest details running through every part of the work, which were necessary to obviate confusion and prevent embarrassing mistakes, in making the book conform to the present standards. Not only was it requisite to introduce all that was new, to alter positions in conformity with the changes in the standards, and to notice and discuss all modifications whether in substance or form; but there was a constantly recurring necessity to solve the various practical problems arising from the substitution of a single one for the three former British Pharmacopœias which were referred to, at greater or less length, in almost every page." The work has been extended to the amount of one hundred pages, which were required by the new matter which presented itself. The articles which are new in it are such as Anilin, Calabar Bean, Carbolic Acid, Coal Tar, Peroxide of Hydrogen, Petroleum, Propylamia, Sorghum, Thallium, Upas, &c. These have been added to the appendix, while it may be noticed that some of the articles formerly in the appendix have been transferred to the body of the work, and some formerly in that location have been placed in the appendix. This has been done in accordance with the proceeding of the United States Pharmacopœia, which pursues the rule of advancing or degrading articles as they may or may not bear the practical test of value.

The article under the head of Cinchona we have always considered as a model of research and description. Originally written and published in the *Philadelphia Journal of Pharmacy*, Dr. Wood has never apparently lost sight of this most interesting subject. It may be regarded, as it now stands, as a concise monograph which contains the latest intelligence. Since the original was penned great advances have been made in the accuracy of our information with respect to the botanical origin of the barks, and where doubt formerly existed, our information has become determinate. With respect to those admitted as officinal, certainty may now be found, and the three which are recognized may definitely be attributed to their true source. Thus the pale is derived from the *Cinchona micrantha* and *condaminea*, the yellow from the *C. Calisaya*, and, lastly, the moot point has been settled with certainty by Mr. Howard in attributing the red to *C. succirubra*.

The second part of the Dispensatory may be said to be the Apothecary's Manual; no other work can be substituted for it in the operations of American Pharmacy. In the present edition the detail of processes has been immensely simplified by the necessity of adhering to only two standards. This must prove advantageous in the dispensing of medicines both to the prescriber and apothecary. The accuracy and fulness of directions are too well known to need an exposition.

Thirty-three years ago the United States Dispensatory was first presented to the medical public. In that time twelve editions, numbering thousands of volumes, have been spread broadcast over the land, diffusing its benefits and elevating the standard of the pharmaceutical science of the country. It is questionable whether parallel success has been met with in any other medical production. The origin of this wonderful popularity originated in the necessity that existed for such a guide. It met a want at the time of its first issue and has continued to supply it to the present moment, and we may pronounce positively that during this long career never has it fallen from the level of excellence with which it commenced, and in this last edition it is as fresh and as fully equal to the requisitions of the age as when originally written by the two eminent men who have been its authors.

Dr. Wood acknowledges his indebtedness in the work of revision to two most competent professors of the College of Pharmacy, Drs. Bridges and Wm. Procter, and it may be said that better assistants could not have been selected.

J. C.

ART. XXV.—*Reports of American Hospitals for the Insane:—*

1. *Of the New York State Asylum, for the fiscal years* 1863-64.
2. *Of the Bloomingdale Asylum, for the year* 1864.
3. *Of the King's County, N. Y., Asylum, for the fiscal year* 1863-64.
4. *Of the New Jersey State Asylum, for the year* 1864.
5. *Of the Pennsylvania Hospital, for the year* 1864.
6. *Of the Pennsylvania State Hospital, for the year* 1864.
7. *Of the Western Pennsylvania Hospital, for the year* 1864.
8. *Of the Maryland Hospital, for the year* 1864.
9. *Of the Mt. Hope Institution, for the year* 1864.
10. *Of the (U. S.) Government Hospital, for the fiscal year* 1863-64.
11. *Of the Missouri State Asylum, for the fiscal year* 1863-64.
12. *Of the Wisconsin State Hospital, for the year* 1864.

1. DR. GRAY, of the *State Lunatic Asylum*, at Utica, N. Y., reports the statistical results of the operations of that hospital for the year ending November 30th, 1864, as follows:—

	Men.	Women.	Total.
Patients at the beginning of the year	267	267	534
Admitted in course of the year	172	147	319
Whole number	439	414	853
Discharged, including deaths	156	133	289
Remaining at the end of the year	283	281	564
Of those discharged, there were cured	59	50	109
Died	30	18	48

Died with phthisis pulmonalis, 13; paresis generalis (*paralysie générale*), 12; exhaustion from mental disease, 7; epilepsy, 1; convulsions, 2; old age and exhaustion, 6; pyemia, 2; paralysis, 3; gastritis, 2.

"Twelve men died from general paresis—a larger number than in any former year. Five of them had been of intemperate habits for a number of years. In three there was a strong tendency to insanity. One was of traumatic origin resulting from a gunshot wound in the head. With one exception, they are said to have been men of strong will and firm determination, but emotional, easily moved to pity, lamentation, anger, and rage. In the majority, no cause could be assigned by the friends; and in those where it was attempted, some trivial occurrence in the early part of the disease which was plainly nothing more than a symptom, was looked upon as the great cause."

The relation between insanity and tubercular phthisis, and the reciprocal effect of these two diseases, has long been a subject of professional interest. In allusion to ten insane females who died in the course of the year with phthisis, Dr. Gray says: "In some the disease had been of long duration, and the mental disturbance had progressed *pari passu*, with the physical disease, and was, no doubt, dependent upon it.

"In others the phthisical symptoms were developed, and ran their course rapidly, while the acute mental symptoms manifested on admission subsided as the lung disease advanced to a fatal termination; and for some time previous to death, the mind seemed nearly, if not quite, in its normal condition."

In the 319 cases admitted, hereditary transmission of the disease was found to exist in the numbers and the relation expressed in the subjoined table.

	Men.	Women.	Total.
Maternal branch of the family	16	11	27
Paternal branch of the family	24	16	40
Paternal and maternal branches	6	2	8
Insane relatives	24	15	39
Total	70	44	114

The following extract is taken from the remarks upon the causation of mental disorder.

"It is confessedly no easy matter to determine, in individual cases, the relative influence of physical and moral causes, and in many instances we may, and do fail entirely to discover any cause; yet we can safely affirm that the disease itself is always physical, and that no moral cause is efficient in its development until the disorder of some function or functions shall have been induced by loss of sleep, defective, perverted, or arrested nutrition, or the exhaustion of the cerebral powers by intense or prolonged action. Thus grief, anger, and other emotions and passions, while always impressing and affecting the physical man, cannot of themselves induce the mental state termed insanity. * * * The prolonged mental disturbance called insanity is no more a disease of the mind than is the transient delirium accompanying fever and other affections."

2. There is hardly another hospital in America the patients received at which afford more valuable materials for the thorough investigation of insanity, than do those of the *Bloomingdale Asylum;* and yet, with one of the ablest of our psychopathists at its head, its reports, from year to year, are confined almost exclusively to a few general numerical statistics.

	Men.	Women.	Total.
Patients in hospital Jan. 1st, 1864	69	72	141
Admitted in course of the year	68	72	140
Whole number	137	144	281
Discharged, including deaths	57	54	111
Remaining Dec. 31st, 1864	80	90	170
Of the discharged there were cured	27	25	52
Died	10	7	17

"The deaths," says Dr. Brown, "were attributable to apoplexy in one case, to general paralysis in one, to disease of the brain accompanied by partial paralysis in two cases, to pulmonary disease in four, to maniacal exhaustion in six, to tetanus, erysipelas, and disease of the kidneys in one case each.

"The usefulness of the Institution, as compared with any former period, has not diminished, while its general prosperity has been greater than for several years past. The number of admissions has exceeded that of any previous year, with a single exception; and the average number of patients resident in the Asylum was larger than at any (previous) time in its history.

"The new building for female patients has been in use throughout the year, and proves in every respect well adapted to its purpose."

3. At the *King's County* (N. Y.) *Asylum*, in the fiscal year terminating with the 31st of July 1864, the number of patients received, as well as of those who were discharged, is greater than in any preceding year.

	Men.	Women.	Total.
Patients in hospital, July 31st, 1863	151	245	396
Admitted in course of the year	99	110	209
Whole number	250	355	605
Discharged, including deaths	82	109	191
Remaining July 31st, 1864	168	246	414
Of those discharged there were cured	48	58	106
Died	14	25	39

Died with phthisis pulmonalis, 11; exhaustion, 7; epilepsy, 4; general paralysis, 4; paralysis 3; diarrhœa, 2; effusion, meningitis, pericarditis, pneumonia, congestion of liver, tertiary syphilis, senile gangrene, and old age, 1 each.

The cause of mental disorder in nine of the cases admitted, is alleged to have been "War excitement."

"The library," says Dr. Chapin, "has been increased, during the past year, by the addition of twenty-four dollars' worth of books. This sum accrued from the labour of the patients."

The great predominance of the number of female patients over that of males will be noticed. The apartments of the former had become so overcrowded, that the old building erected some twenty or more years ago, for *all* the then

existing patients, has been removed to a place adjacent to the new building, and is to be occupied by females.

4. During the year 1864, according to the report of Dr. Buttolph, which is now before us, "the demand for room" at the *New Jersey State Lunatic Asylum* was very great, "especially so on the side occupied by the women, the number of whom has been disproportionately large."

	Men.	Women.	Total.
Patients at the beginning of the year . .	162	164	326
Admitted in course of the year . . .	65	100	165
Whole number	227	260	491
Discharged, including deaths	79	79	158
Remaining at the end of the year . . .	148	185	333
Of the discharged there were cured . . .	30	32	62
Died	21	16	37

Deaths from "general or chronic exhaustion of the vital forces," 15; general paralysis, 3; strangulation by food, 2; bilious fever, 1; exhaustion of acute mania, 8; epilepsy, 4; consumption, 1; congestion of lungs, 1; "obscure disease of the brain," 1.

"Nothing of unusual or peculiar interest has occurred during the last year in the character of the cases received, except, perhaps, a larger proportion than have generally been admitted of extreme cases of melancholy and religious despair. This class of cases give us much anxiety, as they are inclined to refuse food, to take little rest either day or night, to maintain the upright posture so much of the time as to exhaust their strength, and in many cases are disposed to suicide. As a reward for our efforts in their behalf, however, several of the cases have been restored or so far relieved as to again enjoy their accustomed tranquillity of mind."

5. Dr. Kirkbride's report of the *Pennsylvania Hospital for the Insane*, for the year 1864, contains the following general numerical record:—

	Men.	Women.	Total.
Patients at the beginning of the year . .	139	146	285
Admitted in course of the year	100	83	183
Whole number	239	229	468
Discharged, including deaths	102	87	189
Remaining at the end of the year . . .	137	142	279
Of the discharged, there were cured . . .	40	44	84
Died	8	9	17

Deaths from acute mania, 4; apoplexy, 2; epilepsy, 2; pulmonary consumption, 2; dropsy, paralysis, softening of brain, old age, disease of heart, typhoid fever, and "effects of a wound," 1 each.

It will be remembered that in the report of this hospital for the year 1863, it was mentioned that a system of light gymnastics, similar to that of Dr. Lewis, had been introduced into the department for females. "These exercises have been continued steadily during the entire year, once a week during the summer, and twice a week for the rest of that period. * * * At the department for males, too, a large class have received a regular course of instruction."

"These light gymnastics appear, thus far, to be greatly enjoyed by a large number of our household. The class has generally been about thirty, often more, a portion of whom are always attendants, and the interest remains undiminished. Since the commencement, a year ago, there have been sixty-one in the class. Many have obviously been benefited both mentally and physically—all physically—by the exercise, and not a few have joined the class and done well, whose antecedents could not have justified such expectations. Light gymnastic exercises, with a class of proper size, in a bright, cheerful hall, with good music, an appropriate uniform dress, and other accessories to secure general interest, are very different from what they would be, under other circumstances. And it should not be forgotten in other arrangements about hospitals for the insane,

that the surroundings are often almost as important as the thing itself. In the present instance, the gratification given to the spectators is obviously nearly as great as to those actually engaged in the exercises."

A gymnastic hall, 51 by 31 feet in size, and 17 feet high, within, was erected in the course of the year. Its cost, with fixtures and furniture, was five thousand dollars, three thousand of which was contributed by one of the Board of Managers of the hospital.

Under the head of "Objects of Hospitals for the Insane," Dr. Kirkbride incidentally touches upon a subject which has recently been considerably agitated in some parts of the country. We allude to the alleged committal to hospitals for the insane, from interested or improper motives, of persons who are really not of unsound mind.

"As to the suggestion," says he, "that this always painful step (the removal of a friend to a hospital), is often taken from wrong motives, or when no mental disorder exists, I feel bound to say, in justice to those who have had afflicted friends here, that I have no recollection of having met with a single case of the kind among the more than four thousand who have been under my care in this hospital. If such a disposition should exist, or such a wrong be deliberately attempted, I am quite sure that the officers of a hospital would be the first to detect it, the first to rebuke the act, and to insist on proper reparation being made, if it had really occurred. Those who have charge of hospitals regard themselves as the special friends of the patients. If the interests of the patients are in opposition to the interests of any other persons, I trust, and believe, that the officers of hospitals will always be found on the side of the former. There may certainly be errors of judgment on the part of friends, and the officers of hospitals are frequently able to correct these. Both patients and their friends would often be better off, if they could confide more thoroughly in the advice they receive from those whose opinions are at least disinterested. The only cases, in my experience, received or retained in our hospitals for the insane, about whose mental disorder there could be any just question, are the exceptional ones, where individuals labouring under great nervous disturbance solicit admission as a special favour, or of that class of intemperates whose mental difficulty generally disappears in a short time after the disuse of stimulants, but who remain, to endeavour to break off a habit which often proves so utterly intractable, when the individual has access to means for continuing its indulgence.

"It is not to be presumed that in the large number of cases referred to, and the long period during which they have occurred, there should have been no differences of opinion on some of the points under consideration; but it may be stated, as confirmatory of the opinions adopted, and also as showing the enlightened views entertained by our judiciary, that in all the cases that have undergone legal investigation, every patient has been remanded to the care of the institution; showing that there is entire harmony between the statutes of the commonwealth, the practice of the institution, and that "great law of humanity," which a distinguished jurist has justly said, in certain cases, cannot and should not be ignored."

The customary course of lectures and evening entertainments was continued through the usual number of months.

6. The general summary of cases treated at the *State Lunatic Hospital of Pennsylvania*, in the course of the year 1864, is as follows:—

	Men.	Women.	Total.
Patients at the beginning of the year . .	148	133	281
Admitted in course of the year	77	58	135
Whole number	225	191	416
Discharged, including deaths	74	61	135
Remaining at the end of the year . . .	151	130	281
Of the discharged, there were cured . . .	16	24	40
Died	17	12	29

Died of exhaustion from acute mania, 4; exhaustion from chronic mania, 15; disease of the brain, 4; epilepsy, 4; disease of the lungs, 2.

Aside from the statistics, there is but little in Dr. Curwen's Report of special importance to the physician. In treating of agricultural and horticultural pursuits as applied to the treatment of the insane, he says: "The amount of good which these auxiliaries confer on many of the inmates cannot be estimated in any numerical calculation, being of that character which is known only by its ultimate results. It must be borne in mind, however, that the labour of the insane is a very varying element in all our calculations; and often when most needed, least available. This arises from the variable character of their disorder, their inability to sustain active, regular work, and the fancies and caprices which control so many in such a way as to prevent their performance of any systematic labour. The theory of the regular occupation of the insane is very simple and very easily executed, but the practice, as exemplified in the experience of those who have most thoroughly and most effectively tried it in this country, is complex and expensive."

7. The number of patients at the *Western Pennsylvania Hospital*, in the year 1864, was much larger than in any former twelve-month.

	Men.	Women.	Total.
Patients at the beginning of the year	75	55	130
Admitted in course of the year	54	50	104
Whole number	129	105	234
Discharged, including deaths	44	32	76
Remaining at the end of the year	85	73	158
Of the discharged there were cured	18	18	36
Died	8	2	10

Deaths from epilepsy, 2; exhaustion of chronic mania, 2; chronic enteritis, dropsy, consumption, old age, suicide, and exhaustion of acute mania, 1 each.

In discussing the effects of the convulsion through which the people of the United States have been passing, Dr. Reed says: "In the table showing the supposed causes of insanity of those admitted here, fourteen are attributed to war excitement; but it must be remembered that this, as well as other causes in the table, are those assigned by the friends, and are often very far from the truth, having had no more agency in developing the disease than a thousand other topics over which a deranged mind will wander. After a thorough examination of these cases, I am convinced that all of them were caused by agencies altogether foreign to the war, and that the prevailing excitement simply served to give form and direction to their morbid thoughts."

Upon another subject, one which of late years has been discussed in many reports, the Doctor writes as follows:—

"The commitment to the hospital of those who have been guilty of serious crimes, and have been acquitted on the plea of insanity, and of those who become insane after perpetration of some grave offence against society, is growing into an evil of such magnitude as to require our special notice. The sensibilities and prejudices of those who have been farmers, mechanics, merchants, ministers, or the wives, sisters, and daughters of such, do not become blunted by insanity, but, on the contrary, are often increased. To associate with these, who are innocent of crime, the hardened criminal whose evil passions and grovelling instincts are intensified by disease, is not only a cruelty, but cannot fail to prove an aggravation to their already too painful condition."

8. Dr. Fonerden, in his report for the year 1864 of the *Maryland Hospital*, says: "The house has been full through the year."

	Men.	Women.	Total.
Patients at the beginning of the year	64	51	115
Admitted in course of the year	62	30	92
Whole number	126	81	207
Discharged, including deaths	63	24	87
Remaining at the end of the year	63	57	120

Of the admissions, 56 were for mania-a-potu. Of these, 34 recovered, 1 died, and 1 remains.

Of the insane, 19 recovered, and 11 (4 males and 7 females) died.

"Walking outside in suitable weather, and also carriage-riding, continue to be a part of hygienic management. On many fine days it often happens that nearly all the patients are, a large portion of both morning and afternoon, in various parts of the grounds with attendants."

Chiefly by means of a donation from Dr. William Fisher, the President of the Hospital, the accommodations have been improved by the introduction of water fixtures, bath-rooms, and gas for illumination.

9. The whole number of patients treated at the *Mount Hope Institution*, in the course of the year 1864, is 535. But 117 of these had mania-a-potu. The cases of insanity proper were as follows:—

	Men.	Women.	Total.
At the beginning of the year	112	116	228
Admitted in course of the year	126	68	194
Whole number	238	184	422
Discharged, including deaths	126	70	196
Remaining at the end of the year	112	114	226
Of those discharged there were cured	27	26	53
Died	12	15	27

The insanity of twelve of the patients under treatment is attributed to "excitement of the times;" but it is probable that some of these were admitted in 1863, and mentioned in the report for that year.

Of the whole 535, the alleged cause of the mental disorder, in no less than 239 instances, is intemperance. These cases are thus classified by Dr. Stokes, the physician of the hospital.

"Intemperance causing insanity, 35.

"Intemperance causing mania-a-potu, 113.

"Intemperance causing oinomania, 95."

Causes of Death.—Tubercular phthisis, 3; dysentery, 3; senile decay, 4; marasmus, 3; apoplexy, 3; paralysis, 2; typhoid fever, 2; dropsy, chorea, organic disease of stomach, epileptic convulsions, typhomania, exhaustion from maniacal excitement, and hemorrhage from the stomach, 1 each.

Dr. Stokes thus writes of the effects of interviews of the patients with their friends in many cases of recent insanity:—

"So great is the susceptibility to mental impressions in some cases, particularly in the early stage of the disorder, that we have often known a renewal of excitement produced after every interview with their friends. * * * The friends often manifest on these occasions the utmost imprudence and indiscretion. They are often the first to lose their presence of mind and self-possession, and to betray the greatest agitation. They come prepared to pour forth accumulated stores of unpleasant news. They relate to the patient their own domestic troubles and trials, and communicate intelligence the most calculated to produce unpleasant impressions. All this renews the excitement of the feeble brain, and throws into violent commotion its frail and delicate structure."

10. As might reasonably be inferred from the extensive and exciting operations in those spheres whence the *Government Hospital for the Insane* derives its patients, the influx of cases of mental disorder to that institution, though very large in the preceding year, was greatly exceeded in the fiscal year ending with the 30th of June, 1864.

	Men.	Women.	Total.
Patients at the beginning of the year	202	76	278
Admitted in the course of the year	484	25	509
Whole number	686	101	787
Discharged, including deaths	421	15	436
Remaining at the end of the year	265	86	351
Of the discharged, there were cured	282	6	288
Died	66	8	74

Died with "chronic, organic, and functional degeneration of the brain, without other complicative or supervenient diseases before death, 23. Chronic, organic, and functional degeneration of the brain, with epilepsy, 6; ditto, with serous apoplexy, 2; with apoplexy, 1; with *paralysie générale*, 1; with abscess of brain, 1; with tumour of brain, 1; with pericarditis, 1; with typhoid fever, 1; with dysentery, 2; with hemiplegia, 1; with diarrhœa, 2; with phthisis, 2; with meningitis, 3; with pneumonia, 4; with diphtheria, 1. Inanition, 7; diarrhœa, 2; typhoid fever, 1; dysentery, 1; typhomania, 1; phthisis, 1."

Of the 509 cases admitted, 431 were from the army, 18 from the navy, and 54 from civil life.

"The cases of all classes admitted," says Dr. Nichols, "exceed by 42 per cent. those of the previous year, the number and acute character of which were without precedent in the history of the largest American Institutions for the insane. The admissions from the army were nearly 85 per cent. of the whole, and exceeded those received last year by 45 per cent. While the actual admissions of all other classes than the officers and men of the land forces exceeded those of 1862–63 by eighteen (18), the ratio to the whole number admitted each year was greater by 3½ per cent. in the latter year than in 1863–64. Upon the supposition that the number of men under arms did not vary materially in the last two years, it follows that the ratio which the cases occurring in the army bears to the whole number of troops is on the increase.

"The actual admissions from the navy have risen from six (6) in 1860–61, to eighteen (18) in 1863–64, but have not, during a gigantic war, increased in proportion to the increase in the number of officers and men of that arm of the public service. The seaman has a more hardy and unsusceptible constitution than the landsman. In being transferred from the merchant to the naval service, he experiences fewer trying changes in his habits and in the moral influences about him than are involved in a transfer from the workshop and farm to the tented field; and the changes in his condition on shipboard are fewer and less extreme than those which so often and so severely tax the endurance of the soldier in active service. Besides, when a naval recruit is seized with recurrent insanity soon after he has been imposed upon the service, the medical bureau of the navy finds it a practicable duty to discharge him and procure his admission into an institution supported by the community to which his maintenance is properly chargeable. Full one-third of all the cases that have occured in the naval service during the year have been disposed of in that way, much to the advantage of the government, and without injustice to special communities or individuals. But after all else that may be said in explanation of the small ratio of cases received here from the navy, it is without doubt in the main a logical incident of the wise and efficient administration of a government bureau closely connected with the conduct of the war, which, as far as we have ever heard or known, has enjoyed the rare felicity of an entire exemption from censure by any authority, party, or interest."

The general army hospital, which was opened in 1861, in the eastern wing of this hospital, and conducted by its officers, was discontinued at the close of the official year covered by the report before us.

The general and quarantine naval hospital, in one of the buildings designed for colored insane, is still continued.

11. "Since my fifth report," writes Dr. T. R. H. Smith, of the *Missouri State Lunatic Asylum*, "a dark period has occurred in the history of this noble charity, during which it was compelled to suspend its work of mercy and humanity from October 1st, 1861, to September 7th, 1863."

It appears that on or about the day first mentioned, the hospital was visited by a party of rebels and the furniture and other personal and movable property seized, removed and converted to other purposes, to such an extent as to render a suspension of operations necessary. We are not informed of the particulars of this sacking of a benevolent institution. A special report relating the history of it has been published, but we have been unable, hitherto, to obtain a copy of it.

During the suspension, the statute law imposing a special tax—one-sixtieth of one *per cent.*—upon all the taxable property in the State, for the support of

the hospital, was repealed. Subsequently, however, when the time arrived at which the establishment might be reopened with safety, a special appropriation of fifteen thousand dollars gave ability to effect that desired object.

	Men.	Women.	Total.
Patients admitted from Sept. 7th, 1863 .	76	109	185
Discharged, including deaths . . .	17	16	33
Remaining Nov. 28th, 1864	59	93	152
Of the discharged, there were cured . .	7	8	15
Died	9	5	14

Deaths from consumption, 7; ulceration of bowels, 2; epilepsy, chronic mania, gastro-enteritis, typhoid fever, and erysipelas, 1 each.

A very large proportion of the cases admitted were chronic. Among the more recent, the disease in five was attributed to "war excitement." While acknowledging the remarkable exemption from insanity from this source, in a State which must be reckoned among those most devastated by the rebellion, and attributing that exemption chiefly to "the character of the war itself"—the loyalists being thoroughly convinced of the justice and righteousness of their cause—Dr. Smith says: "May we not anticipate with much certainty a fearful increase in the number (of the insane) when this conflict shall have been closed, and the mass of calamities which will have fallen upon so many shall be felt in all its magnitude? * * * Shall we not expect even a more wide-spread influence in dethroning reason from the demoralizing effects of war and the vast amount of physical disease that will be engendered by dissolute habits, and the legitimate and unavoidable results of overwork, exposure, excitement, and gradual exhaustion, necessarily associated with the long-continued discharge of military duties in camp and in field?"

12. Dr. J. P. Clement resigned the office of Superintendent of the *Wisconsin State Hospital for the Insane*, and retired from it on the 1st of January, 1864. From that time, until the 20th of April, the duties of the place were performed by Dr. J. W. Sawyer, Assistant Physician; and, at that latter date, they were assumed by Dr. A. H. Van Nostrand, who had been duly elected as Superintendent.

	Men.	Women.	Total.
Patients in hospital Sept. 30th, 1863 . . .	84	104	188
Admitted in course of the year	59	53	112
Whole number	143	157	300
Discharged, including deaths	64	66	130
Remaining Sept. 30th, 1864	79	91	170
Of the discharged, there were cured			56
Died			17

Died of phthisis, 4; organic disease of the brain, 4; exhaustion of chronic mania, 4; exhaustion of acute mania, 3; general paralysis, 2.

"The entire exemption from the endemic, and epidemic diseases of the country can be attributed to the thorough ventilation of our house, excellent drainage, plain, but wholesome diet, and regular exercise of our patients."

The apartments have been overcrowded, and twenty-five incurable cases were discharged, to make room for curables. Dr. Van Nostrand recommends that the hospital be enlarged, and, as one argument in favour of that object, says: "I am credibly informed that in one bed-room, in the poor-house of one of the wealthiest counties in the State, there are three insane females, chained to the floor or bedstead, never taken out to walk, or ride, or exercise. In another wealthy county, their quarters are less ventilated and more filthy than an ordinary stable."

The longer part of Dr. Van Nostrand's report is devoted to the finances, and the material improvements of the establishment. P. E.

ART. XXVI.—*The Army Medical Staff, an Address delivered at the Inauguration of the Dale General Hospital, U. S. A., Worcester, Mass.*, February 22, 1865. By WARREN WEBSTER, M. D., Assistant Surgeon U. S. Army, etc. 8vo., pp. 56. Boston, 1865.

A WELL-INSTRUCTED, and properly organized medical staff is an all-important part of the military establishment of every nation. When clothed with the powers necessary for the faithful performance of its duties, when its counsel is required, and its decisions promptly carried out in all things having a tendency to affect the hygiene of the army, and promote, or lessen the health and vigour of the troops, and increase or impair their efficiency in the field—when to it, also, is committed the sole charge and management of the sick and wounded, the medical staff becomes then an effectual means of sustaining the army, physically and morally, and of preventing the depletion of its ranks by the ailments to which the soldier is almost inevitably subject, when the laws of hygiene are violated in respect to his food or clothing, the place of his encampment, or the construction and locality selected for his barracks. The medical staff of an army is able, and to a greater extent than is generally supposed, to counteract the effects upon life and limb of the several instruments of warfare, and to return promptly to the ranks as an efficient combatant the soldier wounded in the previous battle.

It is essential, however, in order that the medical staff of the army shall be able to do its duty fully in the prevention of disease among the troops, and in its treatment when it has already occurred, that it be rendered supreme in its own department, that it have full control over the sick and wounded, that it have power to command for them everything their condition may demand, whether in respect to accommodation, attendance, food, or medicine, without being made accountable for its acts, save to its own professional superiors. Even in distributing among the different professional officers the details of the medical service of the army, care should be taken to define with sufficient precision the duties of each, in order to prevent any embarrassment or interference. Let each one have the entire responsibility within his own sphere of duties, answerable, however, for neglect or other misconduct to a board, whose members shall be selected from among the medical staff of the army.

Let it not be supposed, to follow the idea, if not the exact language of Dr. Webster, that enlargement of military authority or increased rank, is claimed for the medical officers of the army, as a matter simply of personal distinction. The claim is based upon the sole reason of public good. No one can suppose that increase of rank or authority will, of itself, give soundness to the judgment, clearness to the eye, or dexterity to the hand of the surgeon; nevertheless, when authority, and rank to enforce that authority, are superadded to all needed professional attainments and skill, it will tend to impart that soldierly *esprit*, without which there may be doctors, it is true, but not army medical officers, clothed with full power to prevent, not less than to cure disease and succor the wounded.

The main theme of Dr. Webster's address is the status of the medical staffs of the armies of England and France, and their respective services during the war in the Crimea, and that of the French, alone, in Italy, compared with the organization of the medical staff of the army of the United States, and its efficiency as evinced during the war in Mexico, and that which arose out of the recent rebellion in the South.

This theme has been discussed with ability. The necessity of an adequate staff of medical men, endowed with all necessary power and under the sole control of its own professional officers, to insure the efficiency of our armies, is clearly exposed and fully sustained by a reference to facts which are matters of public record.

D. F. C.

ART. XXVII.—*A Vest-pocket Medical Lexicon: being a Dictionary of the Words, Terms, and Symbols of Medical Science, collated from the best authorities, with the addition of new words not before introduced into a Lexicon. With an Appendix.* By D. B. ST. JOHN ROOSA, M.D., etc. 18mo., pp. 266. New York: Wm. Wood & Co. 1865.

A LEXICON comprising the several terms which constitute medical technology as recognized by the leading authorities of the profession, is an all-important, or, more correctly, an essential part of the library of the medical student. We are not aware, however, that any especial advantage is to be gained by reducing the Student's Lexicon to a size sufficiently small to allow of its being carried in the vest pocket, or how, when presented in this form, it is rendered a more useful companion to "the student attending medical lectures," than it would be were it made a convenient appendage to his reading-table. There are perhaps some who see an advantage in these pocket lexicons that we do not; be this as it may, all, without exception, will agree with us, that a medical lexicon, adapted for the constant use of the student, be it in a volume of small or large dimensions, should contain very few words besides those in common use by the most approved medical writers of modern times, and that these should be defined with conciseness, but, at the same time, with the most perfect clearness and accuracy.

That these essential features are not the prominent characteristics of the little lexicon before us will be evident upon even a cursory examination. It is burdened with terms which are not in common use or countenanced by any very authoritative medical writer, while many of those recognized as belonging to a legitimate medical technology are entirely omitted. Words, also, swell its lists that are used in precisely the same sense out of the profession as they are in it, and of which no one who is not already conversant with the true meaning should be allowed to enter upon the study of medicine. Very many of the definitions, if they can with propriety be called definitions, are, also, exceedingly vague, defective, and obscure, giving, if any, only an imperfect idea of the actual and entire technical meaning of the terms they profess to elucidate, while many others, though plain enough, are positively erroneous.

Our little lexicon gives for the definition of the terms "*benign*" and "*benignant*" "of a mild character." This may, it is true, be assumed as one of their meanings; their true signification, however, is favourable, without irregularity or malignancy. "*Croup*" is most vaguely defined to be "an affection of the larynx and trachea." "*Caloric*," heat. "*Caustic*," "a substance which burns the living tissue," more correctly that kills or disorganizes the animal tissues. "*Cephalœmatoma*," simply "a bloody tumour." "*Dentition*" is defined to be the period instead of the act of cutting teeth. The definition given of "*fever*," is "a state of being hot." "*Gas*," according to our "Vest-pocket Lexicon," is "any aeriform body." "*Anconeus*" is defined to mean "the elbow *or* extensor of the forearm." Although the word is derived from the Greek ἀγκων, the elbow, it means strictly something appertaining to the elbow, hence it is given as a name to a portion of the triceps brachialis muscle, because situated at the elbow-joint. As the definition of "*ague*," we have simply "intestinal fever;" for that of "*aneurism*," "a dilatation *or* rupture of an artery," instead of a circumscribed enlargement of an artery, with or without rupture. "*Cardia*," the entrance into the stomach," is defined "the pit of the stomach." "*Cervico-brachial*," pertaining to the neck and arm, is defined, "pertaining to the head and arm." The definition of "*goitre*" is "an enlargement of the *thyroid cartilage*;" that of "*ligneous*," woody, "like wood." "*Liquor*," a fluid or solution, means, we are told, simply "a spirituous fluid." "*Olefiant gas*," carbonic vapour and hydrogen, or, more correctly, a compound of acetyl with hydrogen, is vaguely defined "a vapour of carbon and hydrogen." "*Peccant*," an abnormal condition of the fluids of the body in respect to quality or quantity, is defined simply "not healthy." "*Pyrosis*," a burning pain at the epigastrium, attended often with the

discharge from the stomach of a sour fluid, is defined "the belching" [eructation of wind] "of a thin fluid." "*Pylorus*," the opening from the stomach into the duodenum, is defined "a fold of mucous membrane surrounding opening from stomach to duodenum." "*Resection*," the removal of a diseased or fractured portion of the shaft, or the diseased or shattered articulating surfaces of long bones, is defined "the operation of removing the extremities of long bones." Of the word "*sinus*," the meaning, as it is employed anatomically, is given, but not its meaning as used in surgery. "*Spina-bifida*," a congenital deficiency in one or more of the vertebræ, with the protrusion of a bag or tumour filled with a fluid, is defined "a congenital absence of a portion of the backbone." "*Stillborn*," the anæmic, syncopal, asphyxiated or apoplectic condition of an infant at birth, is defined "dead-born." The meaning of "*tampon*," a plug of any material, is restricted to "*a plug of lint*." "*Technology*" is defined "*a treatise on children*;" technology, here, is probably a misprint for "tecnology" (from τεκνον, a child, and λογος, a discourse or treatise), a term, however, which is not in common use. The definition given of "*varioloid*," namely, "mild smallpox," is not positively incorrect; it does not, however, indicate the sense in which the term is almost universally employed, namely, a disease, more or less resembling smallpox, occurring after exposure to variolous contagion in one who had been vaccinated or had had smallpox from inoculation or naturally. The meaning of "*vibices*," purple patches under the skin of a narrow elongated form, as though produced by the stroke of a whip, is set down as "marks of a whip." "*Yawning*," an involuntary gaping of the mouth, often, but not necessarily, accompanied with a deep inspiration, is defined "*a* deep inspiration."

The following we presume must be set down as typographical errors: Alteative, for alterative; alveoli, "the socket" [sockets] "for the teeth;" Kirsch-Wasser, "a distilled fruit" [liquor] "from the cherry;" peridysimus, for peridídymis; pleurilocular, for plurilocular; zonular ciliaris, for zonula ciliaris.

The above are only a few of the defects of the "Vest-pocket Lexicon," sufficient, however, to show that the volume is an unreliable guide for the student to a knowledge of the terminology of the science and the art of medicine.

D. F. C.

ART. XXVIII.—*Report of the Board of Health of the City and Port of Philadelphia, to the Mayor, for* 1864. Philadelphia, 1865. 8vo. pp. 74.

FROM this report we learn that the general sanitary condition of the city of Philadelphia continued to be favourable up to the close of the past year.

The entire number of interments registered was 17,582. Of these, 1,707 were of stillborn infants and persons who died beyond the city limits, 278 of those who died of old age, and 799 of those who died from casualties or from causes unknown, leaving 15,119 as the number of interments of such as had died from actual ascertained disease, including 1,598 soldiers.

Of the whole number of interments, 16,237 were of whites, and 1,309 of blacks; 9,782 were of males, and 7,800 of females.

Of the males, 4,722 were adults; and of the females, 3,472. Total adults, 8,194.

Of the males, 5,060 were children; and of the females, 4,328. Total children, 9,388.

The mortality among adults in 1864 exceeded that in 1863 by 856, or 11.66 per cent.; among children the excess over 1863 was 888, or 10.50 per cent.

Of the deaths, 13,427 were in persons born in the United States, or 76.36 per cent.; and 3,221 were in persons of foreign birth, or 18.31 per cent.; while 934, or 5.32 per cent., were in persons whose place of birth was unknown.

The number of births registered during 1864 was 15,591, being an excess over 1863 of 298, or 1.94 per cent. Of the children born, 8,237 were males, an increase beyond 1863 of 195, or 2.42 per cent.; 7,354 were females, an increase beyond 1863 of 103, or 1.42 per cent.

The coloured children amounted to 242—127 males, 115 females; a less number than in 1863 by 50, or 17.12 per cent.

The *twin births* amounted to 157, being 9 more than in 1863.

Four sets of *triplets* were registered in 1864.

Of *stillbirths*, 788 (462 males, and 326 females) were registered, being an excess over 1863 of 45, or 6.05 per cent.

The number of births in each quarter of the year was:—

First quarter,	January to March inclusive,	4,197 = 26.92	per cent.
Second "	April to June inclusive,	3,568 = 22.86	"
Third "	July to September inclusive,	3,775 = 24.22	"
Fourth "	October to December inclusive,	4,051 = 26.00	"

The number of marriages registered in 1864 was 6,752, an increase over 1863 of 1,278, or 23.36 per cent.

The number and percentage of marriages in each quarter of the year was:—

First	1,953 = 28.92	per cent.
Second	1,546 = 22.89	"
Third	1,463 = 21.67	"
Fourth	1,790 = 26.52	"

Of the grooms, 3,784 = 57.63 per cent., were natives of the United States; 2,753 = 42.37 per cent., were foreigners; while of 215 the birthplace is not given.

Of the brides, 4,021 = 61.28 per cent., were born in the United States; 2,496 = 38.72 per cent., were of foreign birth; while of 235 the birthplace is not given.

The following exhibits the returns of births, marriages, and deaths in Philadelphia for the past four years:—

Years.	Births.	Marriages.	Deaths.
1861	17,271	4,417	14,468
1862	14,741	4,662	15,097
1863	15,293	5,474	15,788
1864	15,591	6,752	17,582

At the Lazaretto Hospital there were admitted 173 patients. Of these, 170 laboured under *smallpox*, 1 under *impetigo*, 1 under *typhus fever*, and of 1 the disease was unknown—an infant five weeks old, that died a few hours after admission.

Of the 170 *smallpox* patients, 112 were males, and 58 females; 134 were whites, and 36 blacks.

The admissions into the hospital were during the first quarter of the year, 33; during the second quarter, 52; during the third quarter, 30; and during the fourth quarter, 58.

Of the 173 patients, 29 died; 28 of the deaths being due to smallpox, or a little over 6 per cent. of all the cases of that disease admitted.

In speaking of the various sources of disease originating within the city, and the means for their prevention and removal, the necessity of a more perfect and extended system of sewerage is urged upon the attention of the City Councils. In connection with the subject of sewerage, we have, in a very important report from a sub-committee of the Board of Health, a discussion of the propriety or impropriety of allowing the entire discharge, through lateral drains, into the common sewers of every species of domestic filth—including what is now collected in sinks and cesspools—the refuse of manufactories, etc., as has been proposed by the public authorities.

"If," says the report alluded to, "our present system of cesspools is, in the language of the City Surveyor, 'an abomination and a nuisance,' your committee are not without authority for the opinion that the continuance of the ordinance granting permits to connect water-closets with sewers, however perfect may be their construction, will constitute, and more certainly in the future, even with an increased supply of water-power for flushing the sewers, an abomination and a nuisance, tenfold more dangerous to the health and comfort of the citizens than the present cesspool system. The danger we apprehend does not depend so much on imperfectly constructed drains from water-closets and privies as on the

accumulation of the solid and liquid ejecta of the population in the sewers themselves, and the exposure it is subject to at every ebb-tide, both in the Delaware and Schuylkill, as it escapes from the sewer outfalls.

"On this subject, Mr. Cheeseborough, in his Chicago report, writes: 'The greatest actual innovation upon the original use of sewers is the immediate connection of water-closets with them, and the consequent abandonment of privy vaults. This, however, has not become universal in any large city yet, though very general throughout Great Britain for the upper and middling classes of houses. The experience of the last ten years, however, has led many to doubt the propriety of its adoption in all cases. The character and habits of the population, the facilities for flushing the sewers, and the nature of the outfall, in regard to becoming offensive, should be carefully considered.'

"One of the most serious evils connected with our present plan of sewerage is the ever-accumulating amount of its offensive solid contents. This collection, derived from the fluid and semi-fluid refuse of almost every department of industry that can be located within the range of the sewers, both public and private, together with the washing of the streets and alleys, undergoes putrefactive decomposition, and hence becomes the source of virulent and toxicological emanations which escape into the atmosphere, whether at the terminations of the sewers, or through the numerous inlets or other openings into them which occur along their course. The danger from these poisonous gases in this city has been on more than one remarkable occasion fearfully experienced during the advent of the various epidemics of yellow fever, which have usually made their first appearance in the immediate vicinity of the termini of the sewers on the river front, and from these nuclei scattering death and desolation in every direction."

"Your committee do not hesitate to offer it as their opinion that our city is not advantageously located, topographically, to be improved in a sanitary aspect by encouraging and perfecting a system of connecting water-closets and water privy drains with the public sewers. The great difficulty lies in the fact that two sluggish rivers creep along the eastern and western boundaries of the present densely populous and business portions of it; and the tidal currents, unable to bear away the sedimentary matters beyond the power of the returning waters, this half-dissolved putrescent material, with the foul additions gathered in their laggard course, from the rivers themselves and the adjacent shores, is brought back and conveyed by eddies into the docks and on the neighbouring banks, only to rankle and ferment at the reflux of every tide, when it is exposed, contaminating the surrounding atmosphere with its offensive and pestiferous effluvia, which have ever been a well-recognized cause for the nourishment and spread of epidemic diseases. Besides this natural disadvantage, which is without remedy, we may refer also to the defective construction of our old sewers, as regards their inclination, size, shape, and uniformity of level, together with the present limited supply of water-power for flushing the sewers, in the event of satisfactory evidence being afforded that the flushing system would be fully adequate to the task of cleansing them." D. F. C.

ART XXIX.—*Hand-Book of Skin Diseases for Students and Practitioners.* By THOMAS HILLIER, M. D., London, etc. etc. With Illustrations. 8vo., pp. 353. Philadelphia: Blanchard and Lea, 1865.

THERE is no class of diseases more perplexing to the student of medicine than those of the skin. From the descriptions, even the most graphic, given in books aided by the best executed drawings, it is scarcely possible for him to acquire such a clear conception of the characteristic features and varying aspects of these diseases in their different stages, as will secure their ready recognition in actual practice. This does not arise altogether from the obscurity of the distinctive phenomena of the several skin diseases when carefully noted in the living subject from the first appearance of the eruption, throughout the several changes it undergoes, whether spontaneously or as the result of the action of

various accidental causes, taking, at the same time, into account the relationship which shall be found to exist between the cutaneous affection and whatever constitutional malady may have been present, previously to its appearance, or may present itself during its course or at its termination.

The difficulty which stands in the way of acquiring an acquaintance with the symptomatology and course of the diseases of the skin and correct views in relation to their pathology generally, has arisen mainly from their having been too generally considered as strictly local in their nature, or as depending in most cases, if not invariably, upon some particular morbid condition of the blood or bile, or of the fluids generally, of the body, overlooking their intimate connection with, if not their entire dependence, in a large number of cases, upon the presence of certain parasitic animal or vegetable organizations. The difficulty is in part due also to the diversity of names that have been given to the diseases of the skin by different authors; to the fact that the same name has been given often to morbid conditions of the surface totally distinct from each other, or to the different aspects assumed by the same cutaneous affection at different stages of its progress, or caused by variations in its intensity, or certain abnormal states of the patient in which it occurs.

To facilitate the study of the diseases of the skin a manual or text-book, clear, accurate, and precise in all its teachings, is an important desideratum. Such a work Dr. Hillier has endeavoured to prepare in the volume before us. It comprises, certainly, a very fair digest of whatever of importance has been furnished to us in relation to the pathology and therapeutics of skin diseases by the older physicians, of the knowledge of these subjects, for which we are indebted to the more recent dermatologists of Europe, and of the results of the author's own experience as physician to the skin department of the University College Hospital, and to the hospital for sick children, London.

The author has to a very great degree simplified the study of skin diseases by avoiding the introduction of new terms, or the use of old terms with a new meaning, and by affixing a definite and invariable signification to every word employed by him.

"All affections attended with eruptions or changes in the health, structure, functions, or colour of the cutis or its appendages, the cuticle, the nails, and the hair," remarks Dr. H., "are really diseases of the skin. A large number of these are dependent on constitutional disease. In some the latter is not very important, whilst in others the external local disease is an unimportant part of a serious general illness. There are some general diseases which, although accompanied with characteristic eruptions on the skin as a part of their anatomical characters, are most conveniently described as constitutional maladies; such diseases are smallpox, scarlet fever, and measles." With great propriety there might be included in the same category certain forms of erysipelas, especially when the disease occurs epidemically.

Dr. Hillier does not enter into a full consideration of the specific eruptive febrile diseases, but confines his notice strictly to the eruptions with which these are accompanied. In the same manner the syphilitic skin diseases are described only so far as to enable the student at once to recognize the various eruptions met with in secondary and tertiary syphilis, while no attempt is made to treat at length the subject of constitutional syphilis.

Ulcers might, strictly considered, be classed with diseases of the skin; their entire consideration, however, the author has left for books on surgery.

The endless variety in the classification of skin diseases adopted by different teachers, the very dissimilar basis upon which each is constructed, and the minute divisions by which they are all mystified and obscured have added not a little to the many other difficulties encountered by the student in his endeavour to acquire a knowledge of their characteristics, their nature, their causes, and their treatment.

The system of classification adopted by Dr. Hillier is founded partly on the natural affinities of the diseases, and partly upon Willan's principle of elementary lesions. He arranges all affections of the skin under four main divisions: 1st, parasitic; 2d, acute specific infectious diseases; 3d, syphilides; 4th, other diseases. In the distribution of the *syphilides* and other diseases, he follows

mainly Willan's principle, but among the syphilides he has introduced, in addition, the vegetating, pustulo-crustaceous, and ulcerating; and amongst *other diseases* he has included hemorrhagiæ, diseases of the sebaceous glands, and heteromorphous exudations. He has omitted tuberculæ as an ambiguous term; instead he has made a genus of *hypertrophies* and *degenerations*. He has also dropped the term bullæ, and included the diseases to which it has been applied among the vesiculæ.

The work of Dr. Hillier will unquestionably serve the student as a useful and faithful guide to the acquirement of a knowledge of skin diseases. Nor will the practitioner, who has not had his attention early directed specially to these diseases, find the work entirely beneath his notice.

The treatment laid down by the author is simple, rational, and in accordance with the results of an extended experience. Dr. H. avoids all unnecessary multiplication of remedies, and rejects all of doubtful value. The absolute necessity is insisted upon, of studying the several abnormal conditions of the skin in their connection with the diseases of the internal organs, and of the organism at large, as the only guide to a rational and successful therapeutics. The error of supposing that the normal condition of either can be restored while the other remains diseased, constitutes one of the most formidable stumbling-blocks in the road to a successful management of skin diseases. The fact that the healthful performance of the cutaneous functions is essential to the healthful performance of the functions of every other organ, and, conversely, must be kept prominently in mind or our clinical ministrations will do little good if they be not often productive of mischief. D. F. C.

ART. XXX.—*Induced Abortion, on Account of Extreme Narrowness of the Pelvis. Prize Essay of the Medical Faculty at Tübingen.* Abridged and Published by FERD. RATTENMANN, M. D., formerly—during three years—Assistant Physician at the Lying-in-Hospital, at Tübingen. 8vo. pp. 51. Philadelphia, 1858.

A MOST important question presents itself to the obstetrician, in reference to those cases of deformed pelvis in which the diameters of the upper strait are so far reduced as to preclude the possibility of a living child being born at the full time by the unaided powers of nature. The question to which we refer is, When, in such cases, pregnancy takes place, what can be done to save the life of the mother, or of the fœtus, or of both? To save both mother and child, three measures have been proposed—the application of the forceps, the bringing on of premature labour, and the Cæsarean section. To save the mother by the sacrifice of the infant compression of the head of the latter by an appropriate instrument, and craniotomy have been suggested and practised. There may, however, occur cases of deformed pelvis in which the diameters of the superior strait are so narrow that the application of the forceps is impossible, while compression of the head to a sufficient extent to allow of its passage through the contracted pelvis, as well as craniotomy, would be attended with almost insuperable difficulties. In such cases the possibility of effecting premature delivery at a period of gestation sufficiently advanced to afford a fair chance for the survival of the child is at best problematical; leaving, therefore, the obstetrician no other alternative than either to resort to the Cæsarean section, and by it endeavour to save the lives of both mother and child, or to induce abortion at some period previous to the sixth month, and by thus sacrificing the life of the fœtus to secure that of the mother.

In the publication before us the latter procedure is very strongly advocated as more uniformly safe to the mother, and in all respects more advantageous, than to wait until the termination of pregnancy, and when natural parturient efforts ensue, to endeavour to effect the delivery of the child by reducing the

size of its head by compression or craniotomy, or by resorting at once to the Cæsarean section.

It is almost universally conceded that, in cases where the shortest diameter of the pelvis is less than 2½ in., parturition is absolutely impossible without the destruction of the life of the child by craniotomy, or without endangering that of the mother by the Cæsarean section, and it is in these cases that the author of the essay considers the induction of abortion to be, under all circumstances, indicated.

We agree with Dr. Tyler Smith, that, whenever the condition of the mother is such as to render her death imminent, unless the contents of the uterus are promptly evacuated—whatever may be the cause from which such condition has resulted, whether diseased conditions of the general system, of the uterus, brain, heart, or other organs, whether deformities of the pelvis or pelvic tumours, it becomes right and necessary to bring about the premature expulsion of the ovum by artificial means. While, in every case, this should be deferred to as late a period as possible of gestation, in order to afford a chance for the survival of the child after its expulsion, the latter consideration, though an important one, should never, however, be allowed to interfere in the slightest degree with the safety of the mother. The possible, but always unassured life of the embryo, cannot, with propriety, be put in competition with the positive and far more important life of the mother.

In making up our decision between the claims of the two operations—induction of abortion, and the Cæsarean section—we are urged in the essay before us to take into consideration the fact that by the first procedure the safety of the mother is certainly secured, while that of the fœtus is not in every case necessarily destroyed; whereas by the second the life of the fœtus is secured only by subjecting that of the mother to a serious and unwarrantable risk. In view of this consideration the author of the essay is in favour of subjecting all patients, even those who are pregnant for the first time, to the operation of induced abortion, in whom the operator has convinced himself of the extreme narrowness of the pelvis; when, upon admeasurement, he finds the shortest diameter to be but two and a half inches or under. But especially is the operation advisable in those females whose previous natural labours had been interfered with in consequence of the contraction of their pelves, and had always terminated in the death of the child.

In most cases of deformed pelvis it is the antero-posterior diameter which is reduced in size. On entering the strait of the pelvis the head is generally in such a position that its transverse (bi-parietal) diameter corresponds with this antero-posterior diameter of the pelvis, consequently it is a knowledge of the measurement of this latter diameter that is of most importance in solving the question as to the propriety of the induction of abortion. We are not, however, in judging of the indications for the operation, to neglect the size of the transverse diameter, or the general form of the whole pelvis; the dimensions of the different portions of its cavity, and the relative dimensions of the fœtal head at the different stages of its development. This is absolutely necessary in order that we may not be led to bring on abortion at a period of gestation when the head of the child has already become so far developed as to surpass in size the actual diameter of the pelvis.

In comparing the operation of induced abortion with the Cæsarean section, while the first is considered as almost without danger, the ratio of mortality of the latter is placed at 70 per cent. This we cannot but consider as an exaggeration. To induce abortion may be, and certainly is, in the great majority of instances, a much less dangerous operation than the Cæsarean section, still it is not entirely devoid of risk. In judging of the mortality of the Cæsarean section, we are to recollect that the operation has unquestionably been performed, in a large number of cases, as a last resource, after the patient had become exhausted from the sufferings of many hours' severe but ineffectual labour, or under other equally unfavourable circumstances, hence its statistics, including all the cases in which it has been resorted to, present certainly anything but encouraging results; but, taking only those cases in which its performance has been well timed, and in patients placed under favourable hygienic cir-

cumstances, it will be found, we think, to be attended by a far less proportion of deaths than that set down in the essay before us. Under all circumstances, however, it is an operation, the magnitude and danger attendant upon which are sufficient to render the obstetrician willing to exchange it for one to which the same amount of objection is not applicable. Such is unquestionably the induction of abortion.

"Hitherto," it is remarked, "it appears that we have not dared to receive the induction of abortion as one of the obstetric operations, and only because we had no cases of precedent to guide us. Thus it happened that this operation was altogether limited to those cases where disease threatened to kill the mother, if the embryo was allowed to exist any longer. On the contrary, in extreme narrowness of the pelvis, physicians were always ready with the Cæsarean section. In those diseases which would absolutely destroy the life of the mother the induction of abortion was considered justifiable, because it was effected to save the life of the mother. The permission of inducing premature labour was also extended to those cases where disease was to be alleviated, which could only be checked for a time. They, therefore, sacrificed the embryo to the interest of the mother, although the advantage to the mother was but of short duration. But is not an extreme degree of narrowness of pelvis, which prevents parturition, most dangerous to the mother? and by what other means can this morbid condition be relieved, unless by the induction of abortion? Besides this, the mother is most desirous to have an abortion induced, that she may escape the fatal dangers and the horrid pains of the Cæsarean section. Why should we hesitate in this case to destroy the child, when our object must be permanently to preserve the life of the mother, and why should we not respect her just claims."

The reports of its successful results, derived particularly from the practitioners of France, are urged in favour of the operation. Thus Dubois, Cazeaux, Lénoir, have performed it several times with the best results, and even all three on the same individual without the occurrence of any unfavourable symptoms.

The induction of abortion and of premature labour is a painless and easy operation. It is performed without any sharp instruments or those which endanger laceration of the uterus or vagina, while the interference with the pregnant womb may be so gradual and gentle as to avoid all injury to it. The operation is therefore considered to be comparatively without danger.

"Moreover," it is remarked, "abortion, unlike all other operations, has the advantage that it may be performed in all constitutions. Even the utmost degree of narrowness of the pelvis is no obstacle, because we possess numerous means of inducing abortion, all gentle applications, and because we are not obliged to introduce voluminous instruments through the straits of the pelvis. On the other hand, the embryo, at the time favourable for abortion, is so little developed, that it will easily pass through the straits of the pelvis if the indications are correct."

In the essay, the most advisable period for the induction of abortion is considered to be at the end of the sixth month, whenever the contracted dimensions of the pelvis justify it; as it is not entirely impossible, experience teaches us, for the fœtus at this period of gestation to be brought into the world alive, and in a condition to enable it, with care, to be reared.

The induction of abortion has been objected to from the hemorrhage which is liable to attend and succeed it, and the liability to retention of the placenta. In respect to hemorrhage it is believed that the danger resulting from it is not of a character that should deter us from the performance of the operation, especially after the fifth month, in cases that imperatively demand it. Professor Breit, it is stated, induced, during the period Dr. R. acted as his assistant, seventeen premature labours in the Tübingen Hospital without a single considerable hemorrhage taking place. He asserts, also, that the dangers of the placenta remaining behind in the cavity of the uterus have been exaggerated by former authors.

"The rare occurrence," he says, "of considerable hemorrhages, as well as the easy detaching of the placenta in abortion, are distinctly shown by our experience in spontaneous abortions, and induced premature labour. It has also been

observed that the discharge of the placenta is not only *not delayed*, but in most cases is effected with great ease.

"That the hemorrhages in case of abortion are not so formidable is sufficiently proved by the fact that frequently women, particularly unmarried ones, in whom the too frequent coition destroys the work of love, miscarry spontaneously with so much facility, that the whole occurrence appears to them as a profuse menstruation, and that they continue to attend uninterruptedly to their daily avocations."

In regard to the recovery of the patients who have been the subjects of induced abortion, general experience, according to our author, shows it to be, in all cases, favourable.

"In the induction of abortion," it is shown, "that it is by no means immaterial in what manner nature is compelled to perform this act. It should only be stimulated in a mild and careful manner, so that abortion may resemble natural labour as much as possible. The best way to obtain the object would probably be to proceed as in the induction of premature labour.

"I. *Preparation.* Baths, opening medicines, injections, venesection (irritation of the mammæ by blisters?), circular friction of the fundus uteri.

"II. *The induction itself.*

"(*a.*) Rupturing the membranes—Method of Scheele.

"(*b.*) Gradual dilatation of the os uteri by means of a sponge—Method of Brunninghausen, Kluge.

"(*c.*) Plugging the vagina (Schöller).

"(*d.*) Injections into the vagina by the ascending douche (Kiwisch).

"(*e.*) Injections into the uterus (Kohen).

"(*f.*) Galvanism.

"(*g.*) Medicines: Secale cornuti, borax, extract of belladonna, hb. sabinæ, etc.

"Besides the above methods, different nations have different ways of inducing premature labour. Thus Dr. Aslarin, Mexico (Odjaca), says, that the women there make a person knead their abdomen with the fists until labour pains follow. Similar manipulations, though of a milder character, such as tightly bandaging the abdomen, etc., called *Ampoekoe*, occur also among the Asiatic nations. The latter method is said to have been lately frequently applied with success, and strongly recommended by Dr. Lackenmaier."

One of the strongest objections that occurs to our mind, against the favourable reception of the operation of induced abortion, in cases of extreme contraction of the pelvis, is the facility with which it may be converted into a screen to enable the practice of criminal abortion to be carried on with impunity. That its approval by the profession may lead to a train of abuses is admitted in the essay under notice, and to guard against this, it is suggested that in every case in which the induction of abortion is found necessary to save the life of a pregnant female, the counsel and approval of several able physicians should be required in order to warrant its performance. This might possibly be sufficient to guard the operation against abuse, in a country where the medical profession had a legally recognized status, and its members certain definite fixed and adequate qualifications, and where it could not be encroached upon by any and every charlatan or ignorant pretender; but in the United States, where our profession is, to a very great extent, entirely ignored by the laws, so far as protection, at least, is concerned, and the name of physician, surgeon, or accoucheur may be assumed by any and every one according as interest or whim shall suggest, the provision just suggested would be worse than futile. But little difficulty would be found in getting together, by collusion, several legally recognized "able accoucheurs," very willing, "for a sufficient price," to approve of the performance of an operation by one of their number in any case or for any purpose whatever.

Happily, cases of such extreme narrowness of the pelvis as to call for a resort to either induced abortion, premature labour, or the Cæsarean section, are as yet of very rare occurrence in this country, consequently there is a less imperative necessity for an early decision as to the comparative propriety of the one or the other of these measures. Speaking for ourselves, we have no hesitation to candidly confess that, in view of the dangers to be apprehended from the

introduction of induced abortion as a legitimate operation in the cases in which it is recommended by the author of the prize essay, we should prefer waiting until the completion of the full period of utero-gestation, and immediately upon the indications of the commencement of labour presenting themselves, to resort to the Cæsarean section. D. F. C.

ART. XXXI.—*The Renewal of Life. Lectures: Chiefly Clinical.* By THOMAS KING CHAMBERS, M. D., Physician to St. Mary's and the Lock Hospitals, &c. From the third London edition. 8vo. pp. 638. Philadelphia: Lindsay & Blakiston, 1865.

IN our number for April, 1863 (p. 387, *et seq.*), we reviewed this work, and the favourable opinion we there expressed of it has been confirmed by the exhaustion of two editions in Great Britain in as many years.

Having already pretty fully discussed the views of the author as given in his first edition, all that is necessary here is to notice the changes which he has made in the present one.

The greater part of the original first lecture has been omitted and the remainder interpolated elsewhere, and many remarks have been dovetailed in the various lectures first published. But what adds most to the value of this edition is the introduction of twenty-three new lectures, three given at the College of Physicians, and the others at St. Mary's Hospital.

We are pleased to see these lectures rendered accessible to the profession in this country, for though, as already stated, we conceive the author's views in many respects open to criticism, still it is a work well calculated to awaken thought and inquiry in a right direction.

ART. XXXII.—*Lectures on Surgical Pathology, delivered at the Royal College of Surgeons of England.* By JAMES PAGET, F. R. S., Surgeon Extraordinary to Her Majesty the Queen, &c. &c. &c. Revised and edited by WM. TURNER, M. B., Lond., F. R. C. S. E., Senior Demonstrator of Anatomy in the University of Edinburgh. Third American edition. 8vo. pp. 737. Lindsay & Blakiston. 1865.

WE hail with pleasure the appearance of a new edition of this classical work by Mr. Paget, which must be regarded as one of the most valuable contributions to surgical pathology since the days of John Hunter.

This edition has been revised and edited by the author's former pupil, Mr. Turner, but under the immediate supervision of Mr. Paget, who states, "I have so worked with him as to be equally with him responsible."

QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

1. *Structure of the Nervous Tissue.*—Dr. Roudanovsky makes his sections of the nervous substance, when frozen, with a double-edged knife; colours them with a watery solution of cochineal, and then covers them with Canada balsam. He says that, in transverse section, the primitive elements of the nerves are pentagonal or hexagonal tubes. Their walls of connective-tissue appear as a network, leaving, in some places, between the tubes themselves and between the bundles of tubes star-shaped closed cavities (reservoirs), by which the nutrition of the nervous elements is effected. The isolation of nerve-tubes is an artificial phenomenon. The cylinder axes, as well as the walls of the tubes, are coloured by cochineal. The cylinder axes are seen in the centre of the tubes as knotty fibres. The cylinder axes give off transverse fibres, which pass through the walls and communicate with similar fibres of other cylinders. In the length of a cylinder axis the transverse fibres of a section of the cylinder axis are given off at nearly equal distances. The transverse fibres are found in the anterior and posterior roots of the spinal nerves, but, perhaps, they are wanting in some nerves. The cylinder axes are surrounded in the nerve tubes by the white substance, which is hardly ever coloured by cochineal, and which in Canada balsam preparations always appears as an amorphous granular mass. In the composition of a bundle of tubes enter large, and fine, and finest tubes. Of the fine and finest tubes the number varies in the different nerves and in their different bundles. They are found particularly in the posterior roots of the spinal nerves, and have the same structure as the large tubes with their cylinder axis. The fine and finest tubes very probably belong to the brain, where they are the predominating, if not exclusive, elements of the white substance. Every nerve contains at once an anatomical substratum of the brain, of the spinal cord, and probably of the ganglions.

In fine sections the gray substance always appears diaphanous, and of a yellowish-gray colour, due particularly to the absence of myeline, giving a dull appearance to the white substance, of opacity. In preparations made with gelatine the myeline appears as fat drops, or sometimes as granular drops. The gray substance of the central organs is composed of cells and nerve fibres like their prolongations or branchings; the white substance of tubes with the characters of those in the nerves. The nerve cells should, without doubt, be considered as the origin of the nerves. They differ in size and shape, in having or not having prolongations, and in the number of the latter. In some parts of the central organs the nerve cells unite by some of their prolongations, thus forming a mesh, at the angles of which are the nerve cells themselves, and thus forming the network of nerve cells. In many parts of the central organs, the

tissue of the gray substance shows meshes formed exclusively of nerve fibres, forming a network of the fibres. On the surface of the optic thalami, these bundles of fibres bend in opposite directions, forming a special arrangement of the meshes, as a network of the knots. Meshes or network of gray substance are an essential characteristic of the central parts, as much as a differing direction of the bundles of the fibres of the gray substance, and of the bundles of the nerve tubes of the white substance. From this it follows, that some of the nerve fibres of the gray substance curve or bend in the white substance in which they appear as the cylinder axis in the tubes of this substance. In nearly all the spinal cord, the general law of the structure of the central organs is observed, the fibres of the gray substance being in opposite direction to that of the tubes of the white substance. The nerve cells communicate by some of their prolongations in the group in which they are found. whether in the posterior or the anterior cornua. Some of the branches of the nerve cells, passing transversely to the axis of the spinal cord, bend inwards and become parallel to this axis, and go to form cylinder axes in the tubes of white substance. There are nerves which leave the central parts of the brain and spinal cord, as tubes, and others that are not so.

In cats, dogs, and rabbits the alterations produced by poisoning by nicotine were indicated by the extreme pigmentation and destruction of the nerve cells, and their prolongations only in the spinal cord where the vagus and hypoglossal nerves arise. The reservoirs also increase in size. Death is effected not only by chemically altering the metamorphosis of the whole organism, but by destroying the little organs such as the nerve cells, which are the origin of the nerves of the chief organs of life. Opium and chloroform act on the myeline, which instead of assuming the granular amorphous form has the appearance of little brilliant bodies.—*Brit. and For. Medico-Chir. Review*, April, 1865, from *Gazette Médicale de Paris*, December 24th, 1864.

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2. *On the Rapidity of the Passage of Crystalloid Substances into the Vascular and Non-Vascular Textures of the Body.*—Dr. HENRY BENCE JONES has communicated to the Royal Society the following results of some observations lately made by him on this subject:—

"It occurred to me that it might be possible to trace the passage of substances from the blood into the textures of the body by means of the spectrum-analysis, and with the assistance of Dr. Dupré some very remarkable results have been obtained.

"Guinea-pigs have chiefly been used for the experiments. Usually no lithium can be found in any part of their bodies. When half a grain of chloride of lithium was given to a guinea-pig for three successive days, lithium appeared in every tissue of the body. Even in the non-vascular textures, as the cartilages, the cornea, the crystalline lens, lithium could be found.

"Two animals of the same size and age were taken; one was given three grains of chloride of lithium, and it was killed in eight hours; another had no lithium; it was also killed, and when the whole lens was burnt at once no trace of lithium could be found. In the other, which had taken lithium, a piece of the lens $\frac{1}{16}$th of a pin's head in size, showed the lithium; it had penetrated to the centre of the lens.

"In another pig the same quantity of chloride of lithium was given, and in four hours even the centre of the lens contained lithium.

"Another pig was given the same quantity, and it was killed in two hours and a quarter. The cartilage of the hip showed lithium faintly, but distinctly. The outer portions of the lens showed it slightly; the inner portions showed no trace.

"To a younger pig the same quantity was given, and it was killed in thirty-two minutes. Lithium was found in the cartilage of the hip; in the aqueous humour; distinctly in the outer part of the lens, and very faintly in the inner part.

"In an older and larger pig, to which the same quantity was given, lithium after one hour was found in the hip and knee-joints very faintly; in the aqueous humour of the eye very distinctly; but none was found in the lens, not even when half was taken for one trial.

"Chloride of rubidium in a three-grain dose was not satisfactorily detected anywhere. When twenty grains had been taken, the blood, liver, and kidney showed this substance; the lens, when burnt, all at once showed the smallest possible trace; the cartilages and aqueous humour showed none, probably because the delicacy of the spectrum-analysis for rubidium is very much less than that for lithium.

"A patient who was suffering from diseased heart took some lithia-water containing fifteen grains of citrate of lithia thirty-six hours before her death, and the same quantity six hours before death. The crystalline lens, the blood, and the cartilage of one joint were examined for lithium: in the cartilage it was found very distinctly; in the blood exceedingly faintly; and when the entire lens was taken, the faintest possible indications of lithium were obtained.

"Another patient took lithia-water containing ten grains of carbonate of lithia five hours and a half before death: the lens showed very faint traces of lithium when half the substance was taken for one examination; the cartilage showed lithium very distinctly.

"I expect to be able to find lithium in the lens after operation for cataract, and in the umbilical cord after the birth of the fœtus.

"A patient of Mr. Bowman's, with a double cataract, was given lithia-water with twenty grains of carbonate of lithia seven hours before the operation on one lens. Lithia was present in each particle of it. After seven days the other lens was examined, and no trace of lithia could be found in it."—*Med. Times and Gaz.*, May 13, 1865.

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3. *On Some Laws of the Production of Twins.*—Dr. J. Matthews Duncan has published (*Edinburgh Med. Jour.*, March, 1865) an account of some interesting investigations on this subject, in which he endeavours to demonstrate the following conclusions:—

"1. The largest number of twins is produced by women of from twenty-five to twenty-nine years of age; and on each side of this climax of fertility in twins there is a gradually increasing falling off in their number, as age diminishes on the one side and increases on the other.

"2. Twins are not regularly distributed among births generally; their production, therefore, is not subjected to the same laws as govern ordinary fertility.

"3. The mean age of twin-bearing mothers is greater than that of mothers generally.

"4. Twins increase in frequency as mothers become older. This forms a striking contrast to the fecundity of a mass of wives (not mothers) which diminishes as their age increases.

"5. Newly-married women are more likely to have twins the older they are.

"6. While the fecundity of the average individual increases with age till twenty-five is reached, and then gradually diminishes, there is some probability that the opposite is true, so far as regards twins alone, fertility in twins being greatest when fecundity is least, and *vice versa*.

"7. The actual number of twins born of a mass of women in different pregnancies decreases as the number of the pregnancy increases.

"8. The number of twins relatively to the number of children born in different pregnancies increases with the number of the pregnancy. In other words, a woman is more likely to have twins in each succeeding pregnancy than in the former pregnancy. The first pregnancy perhaps forms some exception to this rule.

"9. In an individual twin-bearing is, of course, a sign of high fertility at the time. It also, in a mass of women, shows a high amount of fertility, at least, till the time of the birth of the twins.

"10. It is probable, though not proved, that twin-bearing women have larger families than women uniformly uniparous."

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[1] It is not easy to get a regular view of Hugenberger's statistics of twins. But a study of them leads me to entertain some doubt of this exceptional character of first pregnancies.

4. *Precocity.*—Dr. PIAZZA states (*L'Imparziale*) that he was called, in May, 1862, to see a child twenty-nine months old who was menstruating; the discharge presented all the appearances of the menstrual fluid and reappeared the following month. The external genitals were covered with brown hair, the mammæ and nipples were well developed. Instances of still earlier puberty have been recorded.—*Revue de Thérapeut. Méd.-Chirurg.*, 1 June, 1865.

MATERIA MEDICA AND PHARMACY.

5. *Therapeutical Action of Digitalis.*—Dr. WILLIAM MURRAY has published (*Med. Times and Gaz.*, March 18, 1865) some interesting observations on this subject. Digitalis, he remarks, has a special action on three separate organs—the brain, the kidneys, and the heart; in proof of this, witness its decided action in delirium tremens, in dropsy, and in various forms of heart disease.

Dr. M. states: "I have carefully observed from twenty to thirty cases of cardiac disease treated by digitalis, from which the following conclusions have been drawn; some of these will be quoted as very decided cases, showing the true action of the medicine. As the proposed explanation of the action of digitalis accords fully with the ingenious and well-supported theory put forth by Dr. Anstie in his work on *Stimulants and Narcotics*, it may be well to say that he holds that all true stimulants tend to bring tissue action to its normal standard; that when such action is in excess a true stimulant will reduce it, and when below par will bring it to its proper level; he proposes 'that the word stimulant be restricted to agents which, by their direct action. tend to rectify some deficient or too redundant natural action or tendency.' I believe that the action of digitalis, when properly investigated, will confirm these views; and at the same time the investigation of its action will be materially assisted by bearing them in mind. I shall show—

"1. That digitalis will stimulate and strengthen a weak heart, and that the weaker the muscular tissue of the heart the safer will be the administration of the medicine.

"2. That in a hypertrophied heart it will fail to reduce the pulse either in frequency or strength, and in such cases will prove dangerous.

"3. That in a weak organ, acting because of its weakness with great rapidity, it will reduce the number of its contractions, and, as it were, strengthen or tone them down. To strengthen and quicken the action of a weak, slowly acting heart, and to reduce the number of the rapid strokes of a feeble heart, is, according to Anstie, to do the work of a true stimulant, bringing action up to the normal standard on the one hand, and reducing it to that level on the other.

"I. The following case is one of many in which the remedy has removed irregularity and intermission of the pulse, has given power to the heart when exceedingly weak, and increased the rapidity of its action:—

"A lady, aged 50, had suffered for nine years from cardiac disease, and was in an extremity of suffering when I first saw her, having a very largely dilated and weak heart, whose cavities were overladen with blood, and considerable disease of both aortic and mitral valves. A confused tumbling and heaving impulse was all that could be felt in the cardiac region, and feeble blowing murmurs supplanted the natural sounds of the organ. There was no pulse at the wrist, and the large vessels in the limbs had scarcely a pulsation in them.

"A dropsy of the legs and belly was making fast progress, and the usual stimulants and diuretics had failed to give relief. Although thus pulseless and faint, with the heart in so weak and burthened a condition, I prescribed digitalis in doses of ten drops and upwards. In a day or two the organ began to beat more forcibly, the pulse came again at the wrist, the turbulent or confused action became replaced by a quiet, steady stroke, the breathing, before laboured, became easy, and the dropsy began to disappear. In a week the patient was out of bed, and very shortly she so far recovered as to go about in her usual way. After

this she lived for more than a year in comparative comfort and good health, when suddenly the organ again failed, and before digitalis could be administered she died.

"I might add to this cases of aortic regurgitation with dropsy; many cases in which both aortic and mitral orifices were diseased, with dilatation of the walls of the heart, and a weak, irregular pulse at the wrist; cases of simple weakness of the organ, without appreciable disease; cases of dyspnœa from an emphysematous state of the lungs and sluggish pulmonary circulation; all of which were most decidedly benefited by digitalis. I would especially direct the attention of the profession to the use of the drug in cases of bronchitis depending on sluggish circulation, with weakness of the heart's action and emphysema of the lung.

"I have alternated the use of digitalis with the strongest of our stimulants in some of these cases, and have been astonished at the superiority it possesses as a stimulant. From the observation of a few cases in which the drug has been given continuously for a lengthened period, I do not find anything like failure of the heart's action to occur under a month or six weeks, and then a few days of intermission will clear the way for a fresh course of the medicine. In dyspnœa the relief obtained is sometimes most marked. I remember a poor girl with frightful disease of the mitral orifice, having to rest on almost every doorstep on her way to my house, who was so relieved by digitalis as to walk to and fro with ease. I do not think, after trying it in almost all the affections of the heart, that there is a single disease or condition of that organ, *attended by weakness*, in which it may not be given with safety and benefit.

"II. The next condition to which I would refer is that of hypertrophy. In this my experience is not large; but in one uncomplicated case of hypertrophy of the left ventricle without valvular disease, in a man who had an almost Herculean frame, digitalis was fairly and carefully tried. The heart's action in this case was rapid and at the same time very forcible; the digitalis not only failed to reduce this, but it caused an increase in the symptoms, and the patient almost fainted after trying it for one week, so that the medicine had to be changed to tinct. verat. virid., from which decided benefit was derived. I might say that a converse experiment was tried in a boy with mitral disease and rapid action of the heart. Here tinct. verat. virid. failed to give the relief which was most effectually derived from digitalis.

"III. Lastly, as a cardiac stimulant, digitalis ought to reduce too great rapidity of action, *when this depends on weakness*. In this respect the drug has been well tried, and almost universal testimony to its value has been given.

"In inflammatory diseases, in fevers, in phthisis, it is acknowledged to reduce the rapid pulse. In one case of phthisis at present under my care it does this, and most materially lowers the temperature of the body and relieves the daily hectic paroxysm. While, however, it checks the excessive rapidity of the heart's action, it does not therefore weaken its force; so that, as a true stimulant, it brings the organ down to a slower rate of action, but at the same time affords it more power to do its work.

"Thus it appears that the *physiological* action of digitalis is that of a stimulant, in Dr. Anstie's sense of that term; and that in its *therapeutic* properties it is especially useful in cardiac weakness, whether that weakness be accompanied by extremely slow or extremely rapid action. Further, its physiological action as a stimulant may be explained by supposing that in the case of the slow heart it improves the molecular arrangement of the sarcous elements, or that it excites the nerve centres from which the nervous power of the heart is derived; and in the case of the weak but rapid heart it acts by strengthening that regulating or restraining (vital) influence which, while maintaining the activity of tissues at a normal rate, checks undue and riotous action in the same. (*Radcliffe.*) Lastly, let me say that as a diuretic it is at once the safest and best we possess, and the dose may vary from ten drops to half an ounce. This very day I have given nearly half an ounce, in fifteen-drop doses every two hours, to a child three years old, and by so doing have subdued a rapidly developing general dropsy which was threatening the little sufferer's life.

"P. S.—In some cases of mitral regurgitation accompanied by a loud, dis-

tinct murmur, I have felt that digitalis reduced the intensity of the murmur most decidedly, and in one case it seemed to disappear altogether."

6. *Hypodermic Administration of certain Medicines.*—Mr. CHARLES HUNTER, in a paper read before the Royal Medical and Chirurgical Society (May 23, 1865), brought forward the results of his investigations into the effects of medicines when subcutaneously injected. It is now six years since Mr. Hunter proposed the injection of medicines into the cellular tissue with their general therapeutic object in view. In the case of medicines thus injected for general effects, he called the method the "hypodermic," to distinguish it from the endermic, and from the local injection of Wood. From the endermic method, which term is often and erroneously applied to the hypodermic, it differs much; the endermic is a superficial application, which must be uncertain in its action, which may act powerfully and dangerously, or prove wholly useless. The hypodermic differs from the "method of Wood." The latter plan has for its object the local treatment of a local affection. The injection was supposed by Dr. Wood to be efficacious simply through the localization. Theoretically this method must be limited in its sphere of action to neuralgia or sciatica; to those cases alone accessible to the point of the injecting syringe. Mr. Hunter, in advancing the hypodermic method, maintained that localization of the injection in neuralgic cases was theoretically wrong and practically unnecessary. In 1858 and 1859 he brought forward these propositions in the *Medical Times and Gazette:* 1. That equal effect followed distant and local injections in neuralgic cases. 2. That by distant injections the ill effects of repeated localization were avoided, such as local irritation, thickening of the skin, abscesses, etc. 3. That diseases can be treated with benefit and curatively by this plan, which are neither local nor neuralgic, and which have failed to receive benefit from other modes of medicinal administration. Mr. Hunter is inclined to think that the sickness which used rather frequently to follow the localization of the injection, and which is dreaded as an evil attending subcutaneous puncture, is in part due to the localization of the painful part, as he has hardly found sickness occur at all in his experience of the last few years. In 1859 the first cases were published in the *British Medical Journal*, January 8, 1859, *Medical Times and Gazette*, vol. i., 1859, in which Mr. Hunter proved that diseases affecting the nervous system generally could be treated with benefit by the subcutaneous injection; the cases were serious ones, which had resisted other treatment, and were chiefly cases of insomnia and exhaustion from mania, delirium tremens, tetanus, etc. They exemplified the proposition that "by the introduction of narcotics into the cellular membrane of the body we have a mode of attacking and subduing cerebral excitability more rapid, more certain, and more sure in action than by the stomachic doses of narcotics"[1] Cases of spinal irritability and excitement were then treated, and with benefit, in cases in which stomachic doses had failed to relieve. Instances were given of tetanus, chorea, epilepsy, etc.[2] The hypodermic method is considered by the author superior to the stomachic, rectal, and endermic modes of medicinal administration, in emergent cases, in which the indications are for anodynes, antispasmodics, hypnotics, and nerve-tonics. And he has found greater and more permanent benefit to accrue from this mode of treatment than from the stomachic use of morphia, atropia, codeia, and other alkaloids. In many diseases there can be no certainty about the stomachic dose. In delirium tremens, for instance, the pill, the draught, or powder, may lie in the stomach undigested; it may be vomited; it may be absorbed, partly or wholly, and, if the latter, so slowly as to do no real good. In the meanwhile the life of the patient is at stake, and death from exhaustion may occur before that sleep which would save the patient can be procured. The investigations of the author led him to believe the hypodermic administration of any alkaloid for the above-mentioned purposes to be more beneficial than the stomachic as regards rapidity of action, certainty of effect, purity of effect, greater permanence of effect, avoidance of exhaustion. 1. *Rapidity of effect.* With morphia sleep can be procured, or delirium quieted, in a few minutes. Atropia will affect the mouth in two or

[1] Medical Times and Gazette, March 26, 1859.

[2] Op. cit., p. 389, etc.

three minutes, and ease the pain of sciatica when injected into the tissue of the arm in five or ten minutes—in less time, in fact, than is usually occupied for absorption into the blood of the remedy from the stomach. 2. *Certainty of effect.* This, as a rule, ought to follow, for the whole amount (when properly and carefully) injected must be all absorbed and circulated. But by the stomach one can only guess at the amount absorbed, and consequently one has often to repeat the dose to approach a certainty of effect. Enormous doses and quantities of opium may lie in the stomach, doing no good in maniacal and other cases, but rather doing harm through the delay their inertness causes, and the uncertainty as to its absorption. In such cases the hypodermic injection of a small dose will often answer at once, while the opium still lies unabsorbed in the stomach. 3. *Purity of effect.* As injected into the cellular tissue, so is the agent absorbed, and its direct and sure effects manifest themselves upon the system. The same agent (*e. g.*, morphia), given by the mouth, will often cause headache, sickness, giddiness, hepatic and bowel constipation, etc. These ill effects, as they do not, as a rule, follow the hypodermic injection, must be due to the different mode of administration; nor need we wonder that a digesting membrane ever being filled with all kinds of pabulum should modify the vegetable alkaloids whilst chemically acting upon other compounds. 4. *Greater permanence of effect.* The author has had various cases of neuralgia and sciatica which for years resisted the internal administration of opium, morphia, belladonna, strychnia, etc., which cases he has cured with the injection of morphia, atropia, strychnia, or some other alkaloid. The cure has no necessary dependence upon the number of injections. One lady who had suffered much from sciatica had no pain for one year after one injection. Another patient has remained free from neuralgia since 1859 after a single injection. In two cases of sciatica, one a hatter, the other a driver to a florist, three or four years have elapsed since they were treated; there has been no relapse in either; both had walked lame and suffered pain for four or five years. The author attributes the greater benefits thus derived partly to the first three advantages that he believes the hypodermic method to possess, and partly also to the slight shock that the diseased nerves sustain through the rapid way in which the alkaloid is brought into contact with them. 5. *Avoidance of exhaustion.* This is an important advantage of the hypodermic method, chiefly due to the rapidity of its action. In the violent spasms of lockjaw, of colic, or even of retention, life may be lost by delay; but even in minor cases, the longer the time that elapses before relief of the spasm or pain is obtained, the greater the subsequent exhaustion. Many hours often elapse before any benefit follows the use of stomachic medication, but by the injection of the cellular tissue the desired relief can be obtained in from five to thirty minutes, instead of after many hours. In the case of delirium tremens the continuous muscular excitement, exhausting in proportion to its activity, is often stopped in a very few minutes, and then sleep follows. The tonic effects of certain medicines are more strikingly manifested by the hypodermic than by other modes of administration. So-called tonics may be thus administered with benefit when they cannot be borne by the mouth. Quinia may, for instance, cause sickness and headache and fail to do good by the mouth, but greatly benefits by the cellular administration.[1] Agents not called tonics may act as such when thus employed, and, when of the class usually called anodynes, may act more tonically than when given by the mouth. In this paper space must limit me to a brief notice of morphia, thus used for its tonic effects. Morphia may be used subcutaneously, not to relieve pain, nor stop spasm, nor as a narcotic; but as a nerve-tonic in cases of great nervous exhaustion, or of irritability or great mental depression; in cases, in fact, in which the brain has been overtaxed, and the mental equilibrium lost, as in some cases of melancholia accompanied by great and unnecessary anxiety, with insomnia. In mania-à-potu and in delirium tremens I have even used the puncture, with morphia, so to steady and quiet the mind and nerves of the patient as to enable him in a few minutes to walk to his office and go through his duties. In the drunkard, as in the overtaxed and melancholic case, there is great mental excitement, and worry,

[1] Paper by M. Desvignes, Med. Chir. Soc. Reports.

and anxiety, and insomnia. The stomachic anodyne will constantly fail to produce any effects; but the hypodermic dose, even where it fails to give sleep, will almost invariably remove the anxiety, the restlessness, and the nervous irritability which are the states leading to exhaustion, and unfitting him for application to work. Thus administered, morphia has nerve-tonic effects, without the disadvantages that so often attend its use when given by the mouth, for it does not interfere with the liver or the bowels, it does not cloud the brain, occasion loss of appetite, nor cause sickness, with the well-regulated dose. In the mentally overtaxed, or the melancholic patient, the night administration will not always cause sleep; it sometimes rather arouses the brain; it may even keep the patient awake, in "a calm state of dreamy doziness," which has the equivalent effect of good sleep the next day; the patient will arise refreshed, mentally stronger, and fit for his day's work. Upon the spinal marrow and its nerves the tonic effects of morphia are more marked when thus administered. The greater permanence of effect when cases have been cured by this plan, and by a comparatively small number of doses, seems to indicate that something more than the mere anodyne influence has been at work. A lady, Mrs. R., was subject to neuralgia in 1859. She had been at times relieved by morphia and opium; she was treated once by the morphia puncture, and has not since had neuralgia. Another patient, Mrs. W. W., was subject to repeated attacks of tic douloureux. The morphia injection cured it last year; she has had no return, notwithstanding a trip to St. Petersburg in bad weather. Sciatica is more than simple pain of the nerve; although of long standing, a single puncture with morphia may relieve all the pain, but the stiffness, the lameness, the deficient nutrition, remain for some time. The repetition of the injection will restore power or tone; and if three or four injections are used where these symptoms remain, in long-standing cases, the patients will often say they feel more power return with each injection. Stomachic doses do not produce these tonic effects so strikingly.—*Med. Times and Gaz.*, June 3, 1865.

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7. *A New Method of Applying Electricity to the Body for the Treatment of some Forms of Disease, with a Description of the Apparatus.*—Mr. HARRY LOBB, in a communication to the Royal Medical and Chirurgical Society (March 14, 1865), said that "the present methods of applying electricity to the body are, I consider, in many respects faulty. It has therefore struck me that a better plan might be contrived. It is a desideratum to be able to apply a voltaic current of known intensity persistently and continuously to any part of the body for any desired time. To effect this I have had woven a material of silver wire and cotton in such a manner that either the wire or the cotton can be made to come to the surface. This material can be applied next the skin, and can be made to fit any part of the body, either covering a part or the whole of a limb, or to cover an organ or a small surface. It can be either applied with the metallic surface to the skin or the cotton can be moistened, as it is constructed so as to absorb moisture, and applied to the integument. To the end of the silver wire a covered conducting wire is soldered to the material. The method of application is as follows: The organ, part, or limb is completely covered with the material; the nervous centre supplying the organ, part, or limb with nerves is covered with another portion of the material, each having a separate conducting wire leading from it. These wires are led to a small portable voltaic battery supplying sufficient electricity to penetrate the part, and can be modified according to the amount of surface to be acted upon, according to the nature of the disease, etc. The battery can be arranged for quantity by increasing the amount of surface of the elements, or intensity by increasing the number of the elements. To test the intensity of the battery, a galvanometer may be introduced into the circuit, and when this indicates that the current is passing, the number of elements of the battery should be noted; or a voltameter may be introduced into the circuit, and when the water is decomposed it shows that there is a current from several more elements in the battery used than is necessary to penetrate the part. The advantages claimed for this arrangement are, that a persistent and continuous current of voltaic electricity, of known quantity and intensity, can be made to pass through any portion of the body for any speci-

fied time; that this current can be applied generally over any large surface, through a limb, or can be localized in any part, organ, surface, etc., however circumscribed; also an interrupted current from an electro-magnetic or magneto-electric battery can be applied by means of this conducting material with the same ease by the surgeon. Thus the current may be applied by the patient at any time during the day or during the night; or without removing the clothes the surgeon may apply any required current to the patient; or a persistent measured current may be caused to pass day and night or for a specified time, the patient carrying about his person a portable battery. The apparatus, woven material, etc., were exhibited and explained."—*Med. Times and Gaz.*, March 25, 1865.

8. *Alkaline and Earthy Sulphites Externally Applied.*—In the November number of the *Annali Universali di Med.*, Dr. Gritti gives an account of clinical experiments made by him in the Milan Hospital with the alkaline and earthy sulphites externally applied. He employed the sulphite of soda as lotion (ten parts in 100 of water); and also as an ointment, mixed with a glycerole of starch, which he highly praises, as being free from smell and rancidity—820 *grammes* of pure glycerine are mixed with 100 *grammes* of sulphite of soda, then are added 80 *grammes* of starch; the mixture is gently heated in a bath until it becomes of the consistence of a soft paste. This ointment should be spread on the linen at least twenty-four hours before it is used. The chief uses of the sulphites, as used in solution, are—1, diminution of the secretion; 2, diminution and removal of bad odours; 3, rendering viscous and preventing the spread of bad secretions; 4, destroying the elementary constitution of pus; 5, hastening repair; 6, diminishing the sensibility of the surface; 7, hastening cicatrization.—*British Medical Journal*, March 4, 1865.

9. *Medicated Pessaries and Suppositories.*—Professor Simpson brought under notice of the Edinburgh Obstetrical Society some changes that have been made in the form and composition of medicated pessaries, and to throw out some suggestions as to the more extended employment in practice of various kinds of suppositories. He had been in the habit for many years past of applying different kinds of medicated pessaries to the cervix uteri in the treatment of uterine disorders; having been led to their use by finding that bromide and iodide of potassium, and many other substances, could thus be administered locally, which were of no avail in the form of a lotion. As a medium for the administration of drugs the ointment-pessary was not new, for Daremberg, in his late translation and commentary of Oribasius, has pointed out that a form of it was made use of long ago in Rome. Pessaries had not yet found an acknowledged place in the Pharmacopœia; but that did not interfere with their usefulness. Up to a recent date, he (Professor Simpson) had been in the habit of using pessaries composed of simple ointment, with the special drug rubbed up in it, made into a globular shape, and stiffened on the surface by being dipped in some warm melted ointment in which the proportion of wax largely predominated. But, latterly, Messrs. Duncan, Flockhart & Co., of this city had made them for him of cocceine, which presented this great advantage over the old ointment, that it was much more consistent and firm when cold, whilst it melted at a lower temperature, and with greater rapidity. In consequence of this greater solidity of the cocceine it was found that pessaries made of that substance were more easily employed by the patients themselves than the softer and more yielding ointment balls; and the facility of introduction was still further promoted by having them made not spherical, but conical, almost precisely of the shape of a Minié bullet.

Professor Simpson had brought with him specimens of some of these pessaries; but their various constitution and uses would be most easily seen by reference to the following list of them, which had been recently published by the chemical firm to which he had alluded:—

Atropine (Belladonna)	Sedative,	1-20	grain.
Opium	do.	2	grains.
Morphia	do.	¼	grain.

Bismuth, Oxide	Cicatrizing and Emollient		15	grains.
Borax	do.	do.	15	do.
Zinc, Oxide	do.	do.	15	do.
Tannin	Astringent		10	do.
Alum	do.		15	do.
Alum and Catechu	do.		15	do. of each.
Do. Iron	do.		10	do.
Acetate of Lead	do.		7½	do.
Do. do. and opium	do.		5	do. 2 grs. opium.
Matico	do.		10	do.
Sulphate of Iron (dried)	do.		10	do.
Gallic Acid	do.		10	do.
Perchloride of Iron	Hæmostatic		5	do.
Persulphate of Iron	do.		5	do.
Sulphate of Zinc (dried)	Caustic		10	do.
Carbonate of Soda	Antacid		15	do.
Carbolate of Lime.	Deodorant		5	do.
Iodide of Lead	Alterative and Resolvent		5	do.
Do. do. and Atropia	do.	do.	5	do. 1-20 Atropia.
Do. Potassium	do.	do.	10	do
Bromide of Potassium	do.	do.	10	do.
Mercurial	do.	do.	30	do. (*Ung. Hydrarg.*)

Many of the pessaries are made with morphia (½, 1, or 2 grains) in them, to suit cases where a sedative is also required. They are also sometimes made hollow in the centre, to allow of a few drops of chloroform liniment being introduced along with them. Various other kinds of pessaries are made.

Besides being useful in the manufacture of pessaries, cocceine would be found invaluable as a medium for the administration of medicinal substances by the rectum. The ordinary suppository mass was apt to be either so soft as to be difficult of introduction through the anus, or so firm in its consistence as to be very slow of solution; and the result in some cases was, that either the medicine was imperfectly applied, or the suppository was so long of dissolving, that the drug had not the opportunity of exerting its specific action at a sufficiently early period. These drawbacks to the use of suppositories was quite done away with when they were made of cocceine, which is at once firm and fusible; and he (Prof. S.) believed that the advantages attached on its use would now probably lead to the more frequent application of medicines through this channel. We had long been in the habit of administering opiates in this way, especially the muriate of morphia in doses varying with each particular case. For many years the suppositories he had most frequently employed contained half a grain of morphia in each; but latterly, for ordinary uses, he had had them made with only a third of a grain, because in a few exceptional cases the half grain exhibited by the rectum seemed to act too powerfully. Dupuytren had pointed out that sometimes opium seemed to affect patients more powerfully when administered per anum, than in the ordinary way; and this case was one of those where the individual appeared to be unusually susceptible of the influence of the dose. But, besides morphia and the opiates, there was a great variety of other remedies that might be usefully applied in this way, as would be seen from this list of suppositories.

Aloine (with Soap)	1 grain, 5 grains Dry Soap.
Belladonna	¼, 1 and 2 grains (*Ext. Bellad.*).
Bismuth, Oxide	10 grains.
Borax	5 do.
Copper, Acetate of	2 do.
Elaterium	¼ grain.
Ergot of Rye	2 drops Oil.
Gall and Opium	5 grains and 1 grain.
Gamboge	5 do.
Henbane	5 do. (*Ext. Hyoscy.*).
Iron, Alum	3 do.
Do. Persulphate	2 do.
Mercurial	6 do. (*Ung. Hydrarg.*).
Morphia	¼, ½, ¾, 1, 1½, and 2 grains.
Opium	2 grains.
Podophyllin	1 grain.

Santonine	5 grains.
Soda, Hyposulphite of	5 do.
Tannin	5 do.
Zinc, Oxide	10 do.
Do. Sulphate (dried)	3 do.

Thus, there were, first, a number of cathartics which might be introduced into the rectum, and thus often afford relief to patients, without their being subjected to the disagreeable ordeal of swallowing some nauseous medicine. We had all known that nurses were occasionally in the habit of introducing a bit of soap into the bowels of children, with the view of inducing a motion, and the result was thus probably due to the physical irritation that ensued. But the question was, whether we could not introduce some substance into the rectum in the form of a suppository, which would exert such an action on the mucous or muscular coats of the bowel as to lead to a full evacuation. He (Prof. S.) had employed the gamboge suppository in some instances, with a satisfactory result. When introduced into a rectum which was distended with fecal matter, it almost always acted comfortably within an hour; but if introduced into an empty bowel it gave rise to severe griping. He had under his care a lady from Liverpool, who told him the other day with an air of much surprise, that her bowels had acted the night before. She had been habitually constipated, and for many years had had no relief except from the use of an enema, which she used to employ in the morning; and the evening evacuation which had so astonished her resulted from the action of a gamboge suppository which had been introduced. He was not, of course, prepared to say what the precise doses of the different drugs, when thus employed, ought to be; certainly the half-grain of elaterium noted in the list was too large a dose, and in one case had produced some dysenteric symptoms. He sometimes saw, along with Dr. Maclagan, a young lady in whom half a grain of podophyllin in a suppository acted very easily and well; but, in some other patients, the use of a podophyllin suppository had been followed by a very prolonged diarrhœa.

Again, mercury could be administered in the suppository form in cases where it was deemed necessary to salivate, for its specific action was sometimes very rapidly developed when it was thus employed. In this form, moreover, it was one of the most effectual means at our command for the destruction of ascarides; an object which in other instances might probably be attended by the use of suppositories containing santonin or hyposulphite of soda as their active ingredients.

Besides the drugs of the aperient class, we might employ others of a more sedative or tonic character. Thus the acetate-of-copper suppository had been found useful in case of bleeding piles, and he had seen a patient who was suffering from fissure of the anus, and who rebelled against the use of morphia, greatly relieved by employing suppositories containing the dried sulphate of zinc. Ergot might be administered in this manner in appropriate cases; and quinia and iron might be similarly administered—especially with patients whose stomach resented the use of chalybeates. Astringents, too, of every variety, could be employed with the greatest benefit; and, indeed, one could hardly predicate how many kinds of medicines we may yet learn usefully to administer in the form of a simple suppository.—*Edinburgh Medical Journal*, May, 1865.

10. *Basic Nitrate of Bismuth as a Disinfectant.*—This article, when applied to suppurating wounds, is said to remove all odour, and hasten the healing process. It has been employed in scrofulous sores with much success.

11. *A New Soup for Children.* By Justus Von Liebig.—For mothers, who have not the good fortune to be able to nurse their own children, or who are deficient in nourishment for their young, the choice of a food suitable for the support of the latter is an object of importance; custom and opinions differ for the most part on the subject, and as the simple laws of nutrition, which should determine this choice are, generally speaking, wholly unknown to the persons to whom the selection must be left, the bodily development of the

children is frequently impaired in earliest infancy by the mode of feeding them (see my *Chemical Letters*, Letter 30, p. 57). It is evident that a child, deprived of its mother's milk without a nurse (the choice of whom is difficult, and is often connected with dangers of another kind), can be properly nourished only when the food given to it has the same nutritive value as woman's milk.

To obtain proper ideas on this subject, it would probably be well to call to mind that milk contains two kinds of matters, which minister to different functions in the system; from the casein in the milk the principal constituent of the blood is formed, and from the latter the principal constituent of the flesh; the butter and the sugar of the milk serve various other purposes in the body, and are used, in their ultimate form, for the development of animal heat.

The food of man and that of animals have a composition similar to that of milk, in so far as they invariably consist of a mixture of two kinds of matters, of which one fulfils the same office as the casein, while the other supplies the place of the fat and of the sugar of milk; the formation of blood or flesh, and the temperature of the body being thus maintained through the food.

The seeds of the cerealia contain a substance identical with coagulated casein, the seeds of the leguminosæ, peas, and beans contain a matter identical with the cheese as it exists in milk. It is true that the flour of the cerealia contains no sugar of milk and but little fat, but it is rich in starch, which in the stomach is converted into sugar.

For the normal maintenance of the vital process the relative proportion of blood and warmth-creating matters in the food of the animal is not indifferent; in order to increase in his bodily weight, or to grow, the individual needs not only an increasing mass of food, but a varying proportion of blood and warmth-creating constituents in the food.

It is the great merit of Haubner, that he was the first to obtain practical recognition among agriculturists of the importance of the correct proportion between both classes of substances in the feeding of animals, to which I directed attention in my *Chemical Letters*, and through the admirable investigations of Henneberg, Stohmann, Lehmann, Knop, Arendt, Bähr, Pincus, and others, connected therewith, the principles of a theory of feeding have now been obtained, by which the agriculturist or the producer of meat and milk is enabled so to replace the milk in the feeding of the calf, or the hay, the universal food which nature presents to the herbivora, by the admixture of such food at his command, as turnips, oat and rye straw, potatoes, rape-cake, pea-meal, &c., that the latter produce a nutritive effect equivalent to that of milk or hay.

The investigations just alluded to have shown that if the flesh and warmth-creating nutriments, corresponding to the age and wants of the individual, are given in the correct proportion, both produce a maximum of nutritive effect.

A deficiency of warmth-creating constituents may be replaced by an excess of blood-creating matters, but this excess then loses its power to increase the weight of the body. The warmth-creating matters are incapable of producing blood; an excess beyond the proper proportion loses its efficiency.

In this it is assumed that as much food be given to the individual as he has inclination or appetite to eat.

If we suppose that a boy, for the simple maintenance of his bodily weight, needs half an ounce of blood-and-flesh-forming aliment, this will be obtained in potato diet, if the boy is able daily to consume twenty-four ounces of steamed potatoes, for the increase of his muscular substance a greater quantity must be used.

Potatoes contain for one part by weight of blood-forming substance, 9 to 10, say ten parts of warmth-producing matter (starch). In 24 ounces of steamed potatoes there are 5 ounces of starch, of which only $2\frac{1}{2}$ ounces are used in the body for the production of heat; the balance of $2\frac{1}{2}$ ounces passes off by the bowels unused.

In five ounces of peas we have one ounce of blood-forming substance (consequently as much as in 48 ounces of steamed potatoes) and $2\frac{1}{2}$ ounces of starch. It is evident that if we make a mixture of 12 ounces of steamed potatoes, and of peas-porridge prepared from $2\frac{1}{2}$ ounces of peas, we have in it:—

		Blood-forming substance.	Warmth-producing substance.
12	ounces of potatoes contain . .	0.250	2.50 ounces.
2½	" peas " . . .	0.500	1.25 "
14½	Total	0.750	3.75 ounces.

or the proportion of 1 : 5 corresponding to the wants of the body of the boy. The boy will not only more easily assimilate this mixture of 14½ ounces of peas-porridge and potatoes than the above 24 ounces of potatoes alone, which have only imperfectly nourished him, but he will also in this less weight of food appropriate one-fourth more of blood-forming aliments—an excess which is necessary for his growth—that is, to increase his bodily weight.

This example may exhibit the principles which have guided me in the preparation of a food for nurselings: as I have mentioned, they have been verified in a remarkable manner in the feeding of cattle, in the production of flesh and milk.

The composition of milk is not constant; its amount of casein, sugar-of-milk, and butter, varies with the food with which the individual is nourished. According to the analyses of Haidlen, the milk of a healthy woman contains in 100 parts 3.1 of casein, 4.3 of sugar-of-milk, and 3.1 of butter; woman's milk is in general poorer in casein than cow's milk.

If we assume that 10 parts of butter produce in the animal body the same warmth-creating effect as 24 parts of starch, and likewise 18 parts of sugar-of-milk that of 16 parts of starch, we can by the aid of these numbers compare the nutritive value of milk with that of the flour of the cerealia, if we express butter and sugar-of-milk in their equivalents of starch.

In this manner we find that there are contained:—

	Blood-forming matters.	Warmth-producing matters.
In woman's milk	1	3.8
" cow's milk, fresh	1	3
" " " skimmed	1	2.5
" wheaten meal	1	5

Woman's milk is poorer in salts than cow's milk; but it has a stronger alkaline reaction, and contains more free alkali, which *in the different sorts of milk is potash.*

It is evident that we can easily calculate a mixture of milk and flour (a milk-pap), which shall contain precisely the same proportions of blood and warmth-producing aliments as woman's milk (namely, 1 : 3.8); but this mixture could not in other respects replace woman's milk, as wheaten flour has an acid reaction, and contains much less alkali than woman's milk, and (as we must suppose), than is required for normal blood-formation. Moreover, even if starch is not unfitted for the nourishment of the child, by its conversion into sugar during the process of gastric digestion, an unnecessary labour is imposed upon the system, which the latter is spared, if we first convert the starch into the soluble forms of sugar and dextrin. This can easily be done by adding to wheaten flour a certain quantity of malt flour. If we boil milk with wheaten flour to a thick pap, and add to the latter a certain amount of malt flour, the mixture after a few minutes becomes fluid, and acquires a sweet taste.

On this conversion of the starch into sugar, and on supplementing the alkali in the milk, depends the formation of the new soup, which I shall now describe.

The skimmed cow's milk usually sold seldom contains more than 11 per cent. of solid combustible matters (4 casein, 4.5 sugar, 2.5 butter): 10 parts of cow's milk, 1 part of wheaten flour, and 1 part of malt flour, afford a mixture which possesses very nearly the nutritive value of woman's milk:—

	Blood-forming constituents.	Warmth-producing constituents.
10 parts of cow's milk contain . .	0.4	1.00
1 part of wheaten flour contains . .	0.14	0.74
1 part of malt flour contains . .	0.07	0.58
	0.61	2.32
=	1	3.8

The malt flour contains 11 per cent. of blood-forming matter, of which, however, only seven parts enter into the soup.

As wheaten flour and malt flour contain very much less alkali than woman's milk, this must be supplied in the preparation of the soup. I have found that the addition of 7¼ grains of bicarbonata of potash, or of 3 grammes or 45 grains of a solution of carbonate of potash, containing 11 per cent. of the salt, suffices to neutralize the acid reaction of both kinds of flour.

In the preparation of the soup we proceed as follows: One part by weight (half an ounce) of wheaten meal is placed in the little vessel intended for making the soup, to this the milk is gradually added in small portions with constant stirring, the conglomeration of the meal into lumps being carefully avoided; this mixture is heated with diligent stirring to the boiling point, at which it is kept for three or four minutes, and is then removed from the fire.

One part (half an ounce) of malt flour is now weighed, carefully mixed with 45 grains of the solution of carbonate of potash just mentioned, and with two parts by weight of water, and this mixture is now added with constant stirring to the milk-pap; the vessel is then covered to avoid cooling, and is allowed to stand for half an hour.

It is advisable, after the addition of the malt flour, to place the vessel in hot, nearly boiling water, so that the mixture may the longer keep warm; it thus becomes thinner and sweeter. After this time the whole is placed once more on the fire, is allowed to boil again, and the soup is then passed through a fine wire or hair-sieve, which retains the bran of the malt flour.

Those who are acquainted with the mashing process need not be reminded that after the addition of the malt the temperature should not exceed 151° F. The above directions are so calculated that, including the time used in weighing and mixing the water with the malt flour, we have, after the addition of the latter to the hot milk-pap, a mixture of the temperature of 151° F.

The following process is simpler, and, as cooks maintain, more convenient than that just described:—

Half an ounce of wheaten meal, half an ounce of malt flour, and seven and a half grains of bicarbonate of potash, are weighed, mixed first with one another, and afterwards with an ounce of water, and lastly with five ounces of milk; the mixture is then heated with constant stirring, over a very gentle fire, until it begins to grow thickish; the vessel is now removed from the fire, and its contents are stirred for five minutes; these are then heated once more and again removed, when a new thickening occurs; lastly, the whole is brought to a boil. After the separation of the bran from the milk through a fine sieve the soup is ready for use.

Wheaten Meal.—For this ordinary new meal is chosen, not the finest or the first shot meal, which is richer in starch than the whole meal.

Malt.—Barley malt can easily be procured from any brewer. In Germany, or rather in Munich, the malt is so much dried that the starch of many grains appears to be half-roasted. This malt employed in making the soup gives to the latter a taste of bread, which is not unpleasant; usually the malt contains an admixture of many seeds of weeds, which must be picked out with the hand. An ordinary coffee-mill answers for preparing the malt flour, the latter must likewise be separated by means of a hair-sieve, not too fine, from the chaff. Malt prepared from barley is to be preferred to that from oats, wheat, or rye.

Carbonate of Potash.—For the preparation of the solution the ordinary kali salt, carbonas depurata of the pharmacies, answers very well; two ounces of the salt are dissolved in sixteen of water. If spring water be used, there is generally a precipitate of some carbonate of lime; after an hour the fluid becomes quite clear and bright. The carbonate of potash must not be greasy or damp. The bicarbonate of potash is the ordinary crystallized salt.

Note.—In order to avoid the rather troublesome weighing of the flour, we may observe that a heaped tablespoonful of wheaten meal weighs nearly exactly half an ounce; a heaped tablespoonful of malt flour, wiped off at one-half with a card, likewise weighs half an an ounce.

For measuring the solution of potash an ordinary thimble answers; this when

filled holds nearly three grammes (45 grains, 2.8 cubic centimetres) of the solution of potash.

For the milk and the water two ounces are weighed in an ordinary tumbler, then five ounces of water, and the heights at which both quantities of fluid stand are marked on the outside of the glass by attaching pieces of paper.

When the soup is properly prepared it is sweet as milk, and the further addition of sugar is unnecessary; it possesses double the concentration of woman's milk, and can, which is not unimportant for sucklings, be given in the nursing bottle. If it has been heated to the boiling point, it keeps good for twenty-four hours; if this has not been done it turns sour and coagulates like milk; if the addition of potash be neglected, it cannot, in general, be heated to the boiling point without coagulating. In the absence of the potash the soup is difficult of digestion like ordinary milk-pap.

I was first led to prepare this soup by the facts that one of my grandchildren could not be nursed by its mother, and that a second needed a more concentrated food in addition to its mother's milk; the fathers of both children are physicians, who are well able to judge of the effects of the soup. It has proved both in my own family and in other families where it has been introduced, to be an excellent food, and I myself often use it; in coffee it supplies the place of tolerably good cream.

The soup has a slightly mealy or malty taste, to which children soon become so accustomed that they prefer this food to any other. A physician of this place, Dr. Vogel, who has an extensive practice among children, tried to introduce this soup into the families of poor people; in general it did not find acceptance with them, because the thick milk-pap lost its consistence on the addition of the malt, and became thin. The people imagined that its nutritious quality was connected with the thickness of the pap, and was diminished by the malt.—*Medical Press*, May 17, 1865, from *Annalen der Chemie und Pharmacie*.

[We have used this children's food, prepared according to the directions of Prof. Liebig, and have found it to be a most light, easily digestible, and nutritious article of food.]

MEDICAL PATHOLOGY AND THERAPEUTICS, AND PRACTICAL MEDICINE.

12. *On the Cerebro-Spinal Symptoms and Lesions of Typhus Fever, and on the Relations of Typhus to Epidemic Cerebro-Spinal Symptoms.*—Dr. Charles Murchison, the physician to the London Fever Hospital, whose great experience in various forms of fever, and acknowledged acumen and mature judgment, entitle his opinions to respectful consideration, has presented (*Lancet*, April 22, 1865) the following as the conclusion at which he has arrived in regard to the identity of typhus fever and cerebro-spinal meningitis.

"It is well known," he says, "that among the phenomena of typhus the cerebro-spinal symptoms hold a very prominent place. First, there is headache with vertigo and injected conjunctivæ; then come restlessness, sleeplessness, and delirium, followed by stupor or coma. With these symptoms may be associated paralysis of the sphincters or of the detrusor muscle of the bladder, hyperæsthesia, tremors, floccitatio, subsultus or general convulsions, strabismus, tetanic rigidity of the muscles of the limbs, or even opisthotonos. Occasionally typhus commences with violent delirium and other cerebral symptoms, so that more than once I have known it mistaken for acute mania. The disease, in fact, is the *typhus comatosus* of Sauvages—the *brain fever* of many practitioners. Similar symptoms are sometimes, though more rarely, met with in the course of enteric fever, and have lately been made the subject of a separate monograph by Dr. Fritz.[1]

[1] Étude Clinique sur divers Symptômes Spinaux observés dans la Fièvre Typhoïde. Paris, 1864.

"Among the most common anatomical lesions of typhus are engorgement of the venous sinuses of the dura mater, increased vascularity of the pia mater, and an accumulation of serous fluid in the ventricles and in the subarachnoid space of the brain and cord.

"It is not many years since these symptoms and lesions were believed to be the result of inflammatory action in the membranes of the brain and cord, and the treatment of typhus was based upon this belief. But the researches of John Reid and of all subsequent observers have demonstrated that there exists no relation whatever between the degree of vascularity and the amount of subarachnoid fluid on the one hand, and the severity of the cerebral symptoms during life on the other; while it is now universally admitted among pathologists that the lesions of typhus are quite independent of inflammatory action. This is the result of my own observations; and the investigations of John Reid, Peacock, Jenner, Jacquot, Barrallier, and of all modern observers who have had much experience in the *post-mortem* examination of typhus, lead to the same conclusion. M. Moering, of the Russian army, examined the cerebral membranes and subarachnoid serosity in upwards of two hundred cases of typhus, but in no instance could he detect a single pus or exudation corpuscle.[1] The brain in typhus becomes atrophied from want of proper nutrition, and the fluid appears to be effused to fill up space. It has been well observed, that those symptoms which indicate inflammation of the brain under ordinary circumstances, do not indicate inflammation when the case is one of typhus fever. Still, it is not surprising that many modern practitioners, having little experience in *post-mortem* examinations, regard the cerebral symptoms and lesions of typhus as due to inflammation, and that when the disease shows itself in countries where it is little known this should be the common opinion.

"But to the rule above laid down there are exceptions. In rare cases, typhus fever is complicated with unmistakable inflammation of the membranes of the brain. At the time of publication of my work on fevers I was under the impression that this complication never occurred, but subsequent experience has convinced me that I was mistaken. In the interval I have met with two unequivocal cases of typhus complicated with true meningitis and the effusion of lymph on the surface of the brain. One case was that of an infant aged seven months, admitted with his mother into the London Fever Hospital. Both mother and child had a characteristic typhus rash. The infant was feverish and very restless, moved his head constantly from side to side, and died about the fifth or sixth day of his illness, death being preceded by a severe attack of convulsions. After death the pia mater was found to be intensely injected, and there was a quantity of solid lymph plastered over the base of the brain. The second case was that of a girl aged nineteen, who had previously enjoyed good health. During the first night of her illness she was delirious; in the second night she had acute delirium, followed next day by coma. On the fourth day of her illness an eruption of typhus appeared on the chest and abdomen, and rapidly became petechial. On the following morning, at three A.M., the patient died comatose. On examining the body, the petechiæ on the skin were found to be persistent. There was intense injection of the pia mater and of the brain-substance. The white matter presented a pinkish tint, and the gray matter a dark chocolate hue. Large patches of soft, opaque, yellow lymph were found on the surface of the hemispheres following the course of the veins. There was no lymph at the base, and no subarachnoid serosity. Each of the lateral ventricles contained about half a drachm of turbid fluid. In a third case, a girl aged five, admitted into the London Fever Hospital, typhus proved fatal about the fifteenth day from tubercular meningitis; but in the two first-mentioned cases no trace of tubercle could be discovered either in the membranes of the brain or in the lungs. In an epidemic of typhus in 1831, several cases were observed by Dr. Roupell, in the Seamen's Hospital, in which lymph or pus was found deposited beneath the arachnoid.[2] Some of these cases were dissected by Mr. George Busk, F. R. S., who, I find, corroborates Dr. Roupell's description. A case of typhus compli-

[1] Jacquot, Du Typhus de l'Armée d'Orient, 1858, p. 244.
[2] Roupell on Typhus Fever, 1839, pp. 108, 217.

cated with true meningitis is reported by Jacquot.[1] Louis also records two cases of enteric fever in which the signs of recent meningitis were found after death.[2]

"The above remarks appear to me to be not altogether irrelevant to the subject of what is called 'epidemic cerebro-spinal meningitis,' about which much has been said in connection with the epidemic now prevailing in Russia and Germany. The accounts of this epidemic make it clear that it consists for the most part of relapsing fever and typhus, and that in this respect it resembles the Irish epidemic of 1847. One of the diseases composing it, however, has been described as cerebro-spinal meningitis—a true inflammation of the pia mater accompanied by the effusion of lymph or pus, attacking chiefly young children, and 'decidedly infectious.' This malady has been spoken of as prevailing at St. Petersburg, but more especially at Dantzic, on the Polish frontier of Prussia, and in Brunswick, Hesse, and Hanover.

"Epidemic cerebro-spinal meningitis is said to have been first accurately observed at Geneva in 1805, and since then epidemics of it are recorded as occurring in France, Italy, Norway, Denmark, Ireland, and America. For a full account of all these epidemics I must refer to the elaborate works of Boudin[3] and Hirsch.[4]

"It is possible that some of these epidemics were really examples of primary inflammation of the cerebral and spinal membranes; but when this seemed to be the case, it is to be noted that the persons attacked were comparatively few, that no eruption appeared on the skin, and that there was no evidence of the disease being infectious. I would instance in particular the epidemic described by Dr. Mayne, as attacking children in several of the Irish workhouses in 1846, with regard to which the absence was noted 'of any proof that it has ever been propagated by contagion.'[5] But most of the epidemics, it is to be observed, occurred under precisely the same circumstances as those in which typhus appears—that is to say, they occurred in overcrowded and badly ventilated barracks, prisons, and workhouses, and among the poorest of the civil population living in overcrowded houses and narrow courts.[6] Speaking of the French epidemics, M. Corbin[7] says: 'La cause principale à nos yeux (et en cela nous sommes d'accord avec M. Tourdes, avec M. Gasté, et avec la plupart des médecins militaires), c'est l'encombrement.' Speaking of the epidemic in Italy, M. Devilliers writes: 'Elle atteignait des populations pauvres, entassées quelquefois pendant l'hiver pêle-mêle avec les bestiaux.' Like typhus, the disease has been most prevalent in winter and spring, and, like typhus, it has been propagated by contagion. It is true that some writers have doubted its contagious character, just as some observers have denied that typhus is contagious; but the fact that the disease has in many instances been transported by certain French regiments from one locality to another,[8] in my opinion settles the question.[9]

"The American epidemics of cerebro-spinal meningitis, which have been regarded as the precise counterpart of those observed in Europe, may be selected for more detailed investigation; and, in the first place, it is a significant fact that in America 'epidemic cerebro-spinal meningitis' has long been known by the designation 'spotted fever.' At the present time both terms are applied indiscriminately to the same disease. Among its chief symptoms are: rigors, headache, and vomiting, succeeded by acute delirium, and afterwards by coma, and in some cases by convulsions or tetanic rigidity of the muscles; a dry brown

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[1] Jacquot, op. cit., p. 228. [2] Louis, La Fièvre Typhoïde (Obs. 17 and 25).
[3] Boudin, Traité de Géographie Médicale.
[4] Hirsch, Handbuch der Historisch-geograph. Pathologie. Zweiter Bd., s. 624.
[5] Dub. Quar. Journ. of Med. Sci., July, 1846, p. 95.
[6] Hirsch, op. cit., p. 651. [7] Gaz. Méd. de Paris, 1848, p. 444.
[8] Hirsch, op. cit., p. 650.
[9] "Serait il permis à votre rapporteur d'émettre ici, sous sa responsabilité, l'opinion que la maladie appelée méningite cérébro-spinale, ne serait que la forme nerveuse, ataxique, tétanique du typhus lui même."—Gaultier de Claubry, Rapport sur les Epidémies qui ont régné en France de 1841 à 1846. Mém. de l'Acad. de Méd., xiv. 158.

tongue; injected conjunctivæ; albuminous urine, and an eruption upon the skin rapidly becoming petechial. The principal *post-mortem* appearances are: increased vascularity of the meninges of the brain and cord; an effusion of serum beneath the arachnoid and into the ventricles; occasionally lymph or pus beneath the arachnoid; hypostatic congestion of the lungs; enlargement of the spleen; a fluid condition of the blood, and extravasations of blood in various parts of the body. Two of these characters require especial notice—viz., the eruption, and the lesions of the cerebro-spinal membranes. One writer describes the eruption as sometimes 'like measles;'[1] a second, as 'not unlike the spots seen in enteric and typhus fever,' and as sometimes presenting 'all grades from the rose-coloured rash to the deep and permanent petechiæ;'[2] while a third writes of them thus: 'The more recent and smaller ones disappeared on pressure, while the larger ones were ecchymotic in character. The larger ones were dark in their centres, and of a light red along their margins. Their form was exceedingly irregular; they were notched and irregular in outline, and either angular or nearly rounded, none having any definite oval form.'[3] Lastly, Dr. Upham, in one of the ablest memoirs on the subject, observes: 'Petechiæ were not an unfrequent manifestation—in appearance almost identical with the true typhus eruption, and, like that, seen upon every part of the body except the face—persistent on pressure, varying in hue from the darkest aspect of measles to that of the true petechial spots imbedded in the skin.'[4] No better description could be given of the eruption of typhus. With regard to the cerebral lesions, it is to be noted that though, as in typhus, lymph and pus were found in some cases, in many the effusion was simple serum, while in others the brain and membranes were perfectly healthy; so that, according to a late writer, 'the conclusion is irresistible that the disease consists of a pathological condition of the system at large, whereof the various local lesions are but the accidental complications.'[5] If to the above characters be added the facts that its contagiousness is a disputed question, and that it has been found to prevail chiefly under circumstances of overcrowding and inadequate ventilation,[6] it cannot be surprising that many American physicians admit the close relation of cerebro-spinal meningitis to typhus, while some maintain the identity of the two diseases.[7] It may be well, therefore, to consider the four points of distinction between them laid down by one of the latest writers on the subject, Dr. Lidell,[8] and in doing so I adopt the writer's own words.

"1. 'Spotted fever often runs its course in a few hours; typhus requires at least several days.' The rapid course of many of the American cases, and of epidemic cerebro-spinal meningitis generally, is no doubt remarkable, but is not sufficient to found a distinction, for many cases of typhus are on record where the disease has terminated fatally on the second or third day, or even after a few hours. Such were the cases of *typhus siderans*, or *blasting typhus*, which devastated the garrisons of Saragossa, Torgau, Wilna, and Mayence during the wars of the first Napoleon. Similar cases were observed in Ireland during the epidemic of 1847–48, and amongst the French troops in the Crimea in 1856.[9]

"2. 'Spotted fever is frequently attended with convulsive movements; typhus is never so accompanied.' My experience of typhus is precisely the reverse. Convulsive movements are not uncommon. During the last three years upwards of forty cases of typhus complicated with general convulsions have been observed at the London Fever Hospital,[10] and in several instances I have noted

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[1] Report on Spotted Fever in New England, p. 131. 1810.
[2] Woodward, American Medical Times, May 14, 1864, p. 232.
[3] Clark, ib., p. 236.
[4] Hospital Notes and Memoranda on Epidemic Cerebro-Spinal Meningitis. Boston, 1863.
[5] American Journal of the Medical Sciences, Jan. 1865, p. 27. See also ib., July, 1864, pp. 138–140.
[6] *Vide* Upham, op. cit., p. 28.
[7] American Medical Times, May, 1864, p. 237; and Upham, op. cit., p. 37.
[8] American Journal of the Medical Sciences, Jan. 1865, p. 26.
[9] For references to these epidemics, see my work on Fevers, p. 179.
[10] Ib., p. 160.

strabismus, tetanic contractions of the muscles of the limbs, and even opisthotonos.

"3. 'Spotted fever patients often die very suddenly and unexpectedly of coma and asphyxia; typhus patients do not die in this way.' According to my experience of typhus, the most common mode of death from the primary fever is by a combination in various proportions of syncope and coma. A large proportion, also, of fatal typhus cases are complicated with pulmonary disease, and then death occurs by coma and asphyxia. Moreover, I have repeatedly known patients who appeared to be going on well become suddenly comatose, and die in a few hours.

"4. 'The eruption in spotted fever frequently appears on the first day; while in typhus the eruption does not appear till the end of a week or more.' According to my experience, the eruption of typhus usually appears on the third or fourth day, is rarely delayed beyond the sixth day, and may sometimes be noted on the second day. It is well known, also, that in severe cases of most blood diseases petechiæ may appear as early as the first day. The sooner the eruption of variola appears the more grave is the case.

"These considerations seem to justify the opinion that the grounds for drawing a specific distinction between the epidemic cerebro-spinal meningitis or spotted fever of America and typhus fever are most inconclusive, and particularly when it is recollected that typhus fever running the ordinary course has been prevailing in many parts of America since the commencement of the present war. I agree entirely with the opinion expressed by Dr. Upham. 'The disease,' he says, 'seemed to me rather to partake of the nature of typhus, in a severe and malignant form, identical in its essential elements with the typhus fever of Great Britain, which, under the names of maculated typhus, ship fever, camp or jail fever, has many times been observed in this country—having, in this instance, a special direction to the meninges of the brain and spinal cord.' And if we study the account of the epidemic cerebro-spinal meningitis which is said to prevail at present in Russia and Germany by the light of the American descriptions, we are forced, I think, to a similar conclusion. It is needless to recapitulate the symptoms of this epidemic, for they are almost identical with those observed in America, including an eruption which sometimes resembles that of measles. But if we bear in mind, further, that this Russian cerebro-spinal meningitis is said to be 'decidedly infectious,' that its prevalence is favoured by overcrowding and bad ventilation, and that there is a concurrent epidemic of undoubted typhus, it seems probable that the infectious cerebro-spinal meningitis of Russia and Germany is merely typhus running a rapid course, with severe cerebral symptoms, and sometimes with actual meningitis, as in the cases observed at the London Fever Hospital. At all events, the possibility of such being the case must not be lost sight of.

"It would be a fit subject for inquiry if any relation exists between the frequency of convulsions in the typhus of Russia and the use of bread containing spurred rye. A disease, termed 'convulsive ergotism,' distinguished by the characters of an acute comatose affection—giddiness, dimness of vision, insensibility, convulsions, imperceptible pulse, and death within two days—is said to prevail in the epidemic form in various parts of the continent where rye constitutes a considerable proportion of the food of man.[1] There is, however, no evidence or probability that this disease is infectious.

"In conclusion, I would only observe that, before attempting to establish a new specific disease, it is necessary to keep in view the many modifications which those already known to us may undergo; and more particularly to study their etiological relations, and the circumstances under which they arise and are propagated."

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13. *Different Spinal Symptoms observed in Typhoid Fever.*—The occurrence during late years of an epidemic disease, termed by some cerebro-spinal meningitis, by others spotted fever, and in many instances its prevalence simultaneously with typhoid and typhus fever has led to a discussion in regard to the relation-

[1] *Vide* Christison, Treatise on Poisons, p. 668. 1829.

ship of these affections. Dr. Murchison maintains that the epidemics of cerebro-spinal meningitis, which have prevailed in this country, and are now prevailing in Germany and Russia, are really epidemics of typhus.

Dr. E. FRITZ, in a work recently published,[1] endeavours to prove that spinal symptoms in typhoid fever have been too much viewed as accidental complications. This work has not yet reached us, but we take from a contemporary[2] the following translation of its concluding portion:—

"It follows (he says) from the facts which we have stated, that the spinal cord is more or less subject to disturbance in a large number of instances of those attacked with typhoid fever, and at different stages of the disease.

"In its prodroma, and at the beginning of the first week, the spinal symptoms are seen to be light, and yet are easily observed in more than a moiety of the cases.

"These symptoms are lumbar pains, in all respects like those which so often commence an attack of variola, occasionally, as in that malady, accompanied by a partial paralysis of the lower extremities, or more frequently by cutaneous and muscular hyperæsthesia; painful shootings in the limbs; rachialgic pains more or less intense in the dorsal region; a pain, often severe, in the back of the neck, radiating to the occiput, interfering with the motions of the head and neck, and sometimes attended by pains of the inferior extremities and a feeling of stiffness of muscles; lastly, great sensibility (spinal hyperæsthesia) from pressure on the spinal apophyses in the aching parts.

"These symptoms are not more inconstant than the majority of those which form a part of the general description which is commonly given of typhoid fever; it is right, then, that they should not be omitted.

"They usually continue to the middle or end of the first week, when they disappear; as likewise, in a large number of cases, the cerebral symptoms, which at first occurred, now cease, or a little later.

"But it is not always thus: the spinal symptoms, as well as those of cerebral disturbance, may attain even from the incipient attack an unusual intensity, then increase in number, be variously associated, and take a more decided rank in the total of the phenomena, and persist to an advanced stage of the disease.

"From the most simple to the most complicated cases, there is in relation to these symptoms a series of insensible transitions, and it results from the autopsies which have been made, and from the clinical analysis, that even in the cases in which the spinal symptoms have attained an unusual violence, no proof is afforded of the presence of myelitis or of spinal meningitis accidentally complicating the fever. At most, only in a very limited number of instances can the spinous symptoms be referred with any strictness to a congestion of the membranes of the spinal cord.

"It may be affirmed, too, that most commonly the spinal cord and its membranes are not the seat of any appreciable material lesion.

"The symptoms in question are not accidental complications, more than the cerebral symptoms are in those cases in which they acquire an exceptional intensity; consequently, if we allow of a cerebral variety or form of typhoid fever, we should, to include the class of symptoms above described, accept a spinal variety, thereby indicating a predominance of spinal symptoms. These symptoms are not the only ones which belong to the spinal varieties of this fever.

"The phenomenal tableau of these varieties comprehend almost entirely the semeiotic of the spinal cord.

"Amongst the alterations of sensibility, first should be mentioned cutaneous hyperæsthesia, extending over a considerable portion of the body, sometimes to the four extremities, and to the trunk and neck, accompanied often with muscular hyperæsthesia; next, spinal hyperæsthesia, reaching from the atlas even to the sacrum; then, in decreasing frequency, rachialgia, with painful radiation to different parts of the body, insupportable pains in the lower extremities, rarely in the superior; violent pains in the chest; pains in the waist; neuralgic pains,

[1] Etude Clinique sur divers Symptomes Spinaux observés dans la Fièvre Typhoïde. Par Dr. E. Fritz, Lauréat (Médaille d'Or), &c. Paris, 1864.

[2] British and Foreign Medico-Chirurgical Review. April, 1865.

bilateral and symmetrical; abnormal sensations of cold, formications; a sense of pricking along the vertebral column, and in the members; cutaneous analgesia, and anæsthesia; muscular anæsthesia.

"The derangements of the motor functions of the cord are not less various: paralytic symptoms, numbness of the extremities, paraplegia, partial paralysis of the respiratory muscles, constipation, retention of urine, paralysis of sphincters, spasmodic symptoms, spasmodic dysuria, spasmodic or convulsive contractions of the respiratory muscles, or of the muscles of the extremities, rigidity of the muscles of the neck, contractions of the extremities.

"Here, perhaps, might be introduced with propriety symptoms of a tetanic kind.

"To this sketch it is proper to add a special group of symptoms originating in the medulla oblongata, such as extreme dyspnœa, independent of any affection of the voice or of the respiratory muscles, spasm of the pharynx and larynx, convulsive cough, aphonia, alalia, masticatory glossoplegia, spasmodic or rhythmic contraction of the sterno-mastoideus and trapezius muscles, paralysis of the pharynx.

"The spinal varieties of typhoid fever are rarely unmixed; they are often enough accompanied by cerebral, thoracic, or other phenomena of great intensity.

"Of these complications, as regards diagnosis, the most important is the coincidence of the spinal form with grave cerebral symptoms (the cerebro-spinal variety of M. Wunderlich). It is amongst infants and young women, and individuals labouring under anæmia, that the spinal cord appears to be more especially affected in typhoid fever.

"The spinal varieties of the disease have generally been observed, but not always under these conditions. It does not appear that hysteria conduces to them.

"The spinal symptoms are of irregular occurrence; at times, they are rarely witnessed; at other times they are frequent, and of great intensity.

"The severe spinal and cerebral forms are more prevalent when the disease is epidemic than when sporadic.

"The study of the symptoms of the spinal varieties of typhoid fever is of the highest importance in relation to diagnosis. Owing to a want of knowledge of these deceptive varieties, typhoid fever has not unfrequently been mistaken for spinal and cerebro-spinal meningitis, and this even by individuals of much experience in clinical practice.

"Such an error may almost always be avoided by marking the absence of harmony in the different functions of the cord; the integrity of some of these functions contrasted with the profound perversion of others; the mobility of symptoms, their irregular succession; the expression of the face, the nature of the delirium, epistaxis, gastric troubles, iliac pains, diarrhœa; the outbreak of lenticular rose-spots, sibilant râles.

"The spinal symptoms of moderate intensity nowise seem to differentiate typhoid fever from various acute maladies, which may simulate it at the beginning.

"The prognosis of the spinal forms, and especially of the cerebro-spinal, is almost always serious, and most of all in adults. The mortality of these cases is great, the duration is generally long, and paralytic or other accidents are not uncommon sequences.

"Symptoms implicating the medulla oblongata always require a very guarded prognosis; and dyspnœa, with extreme depression at the beginning, without pulmonary complication, denote almost always a speedy and fatal termination.

"The spinal symptoms of typhoid fever never, *per se*, require bloodletting: the contrary is mostly indicated. When the symptoms are threatening, dry cupping or scarifying should be applied along the course of the spine, with cutaneous revulsives, stimulating baths, cold lotions, and repeated purgatives.

"Belladonna given internally may, perhaps, be useful, whilst all the preparations of opium appear to be contra-indicated.

"Lastly, as palliatives, topical emollients and anodynes may be of some service."

14. *Epidemic Cerebro-spinal Meningitis in Germany.*—In the fifth number of the *Archiv der Heilkunde*, for 1864, Professor WUNDERLICH gives an account of nine cases of this affection which fell under his notice in the spring and summer of last year. The following abstract of the author's summary cannot fail to interest those of our readers who witnessed the ravages of the recent epidemic in this country.

No cause could be assigned for the disease, which seemed to select for its victims the young and robust. There was not the slightest evidence of its contagiousness.

Sometimes the onset was sudden; sometimes premonitory symptoms were observed, but they passed very rapidly into the fully developed attack. Its phenomena were of the most frightful character, more so, indeed, than belong to any other epidemic disease.

The nervous phenomena were various, and indicated that, although their origin was in the cerebro-spinal axis, yet the share of different portions of the nervous centres in producing them must be different. Thus, while in seven cases the phenomena were cerebral, as very severe headache, delirium, sopor, and deafness, in the remaining two cases they were spinal, as excessive pain in various parts, or paralysis. Hence it may be inferred that sometimes the membranes, and sometimes, again, the medullary substance, are involved. It is also noteworthy that, unlike other forms of meningitis, this one did not present constant alterations of the pupils nor spasms of the facial muscles, and that, in spite of the spinal exudation, paraplegia was only once observed.

The number and severity of the symptoms did not always correspond to the degree and extent of the anatomical lesions, as, indeed, is generally the case in epidemic (infectious) diseases. As just stated, paraplegia occurred only once, and in another case with very profuse exudation, extending as low as the cauda equina, there was no paralysis.

However various and diverse the nervous phenomena might be, there was invariably opisthotonic retraction of the head, contraction and pain in the muscles of the neck, pain in the loins, and in most cases headache of very unusual severity.

The other phenomena were various: in five cases nausea and vomiting, in two constipation; overaction of the heart in two cases; herpes in two; in one case an eruption of "hyperæmic" spots, which rapidly increased in number, were somewhat rounded, as large as a lentil, somewhat elevated, and seated especially in the upper extremities, and less on the trunk than on the lower limbs; in all cases there was more or less fever, but in one only did the attack commence with a chill.

As regards treatment, local depletion seemed to be advantageous in sthenic cases; ice in bladders was applied to relieve the pain in the head, and appeared to be of some advantage. To the spine its application was more hurtful than useful. Morphia appeared to assuage the spinal pain in one case, in which also chloroform by inhalation and in liniment was used. This case ultimately recovered. The iodide of potassium was administered in three cases which terminated in cure. Thirty grains a day were prescribed, and this dose continued for nine, eleven, and thirteen days in the several cases. The medicine was given when the symptoms seemed almost to forbid a favourable prognosis. In one case, remarkable for the intensity of the pains, it seemed to exert no beneficial influence, and, after a trial of eleven days, was abandoned. Dr. Wunderlich, therefore, believes that iodide of potassium is to be recommended, especially in protracted cases of the disease.

Dr. Wunderlich states that he has not heard of any instances of cerebro-spinal meningitis since the epidemic which prevailed in Europe from 1838 to 1849. His own narrative is the only one that we have met with of any foreign cases since our painful acquaintance with the disease at home. A. S.

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15. *Epidemic Cerebro-spinal Meningitis in Berlin.*—The Berlin correspondent of the *Medical Times and Gazette* gives (April 22, 1865) the following account of the symptoms and post-mortem appearances in a case of this disease, observed by Dr. FRENTZEL in the barracks of the Alexandria Regiment.

J. M., aged 20, previously in good health, had rigors one night, and complained of headache. He vomited a mucous liquid once. In the morning he was almost unconscious, and did not answer questions. The head was drawn backwards, the muscles of the neck very rigid, and slight pressure on the nape of the neck, especially near the vertebræ, made him scream. The abdominal muscles were also rigid, and pressure on the parietes was painful. The patient lay on the side or on the stomach, but not on the back. Mouth firmly closed, considerable force being necessary to open it in order to see the tongue. Roseola over the whole surface of the body; but this disappeared the next day. Chest healthy; no tumour of the spleen; pulse 75 in the morning—100 in the evening; temperature 103.6; number of inspirations 30; pulse next morning, 132—in the evening, 92. On the third day the pupils appeared very much contracted, and did not act against light. The patient, who had been delirious during part of the previous day and night, became now very quiet and comatose. There was opisthotonos, and great sensitiveness of the back. On the fourth day, there appeared inflammation of the orbit, prominence of the eyeball, and œdema of the conjunctiva. The next day there was a bloody motion and bleeding from the nose. On the morning of the sixth day death ensued. The autopsy was made thirty-three hours after death, the temperature being then 55°. Livid spots along the back and the extremities; muscles of the back very dark. The dura mater of the spinal cord generally pale; the veins considerably filled on its posterior surface. It had a yellowish colour in the lower parts of the lumbar portion; and the pia here contained a considerable quantity of fluid, pale, yellow pus. The quantity of pus in the pia diminished towards the upper part of the spine. In the cervical region there was no pus at all. About the seventh cervical vertebra the veins were more filled than usual. Purulent infiltration extended below on both sides, from the cord to the posterior roots of nerves, which in their course in the vertebral canal were completely enveloped by pus. On the *anterior* surface of the spinal cord the internal aspect of the dura was normal. In the lumbar portion of the pia there was considerable purulent infiltration; in the dorsal portion this was only seen in a few places; the cervical portion was normal. Cervical portion of the cord normal; in dorsal portion the white matter was rather moist; at the posterior horns pretty extensive injection of bloodvessels; the gray matter of lumbar portion was extensively reddened. *Skull* large; top rather thin; diploe full of blood; dura hyperæmic; numerous soft coagula in sinus longitudinalis; inner surface of dura dry; pia rather dry on the gyri, while the large veins in the sulci are filled with a great deal of dark blood; pia there being œdematous, and infiltrated with pus. Pus most considerable on the left side close to the median line, but also on the right side, especially in the anterior portions. Pacchionian granulations likewise filled with pus. Extensive purulent infiltration on the basis cerebri, more especially at the infundibulum and the anterior portion of the pons. Both optic tracts thickly covered with pus; posteriorly the pus follows the course of the basilar artery; is very thick on the vermis inferior of cerebellum. Lateral ventricles rather wide, contain a yellowish turbid liquid. Velum choroides thickened, contains a yellow mass which cannot be separated, but is in the tissue itself. Brain matter very flabby; vessels of white matter congested. Gray matter dark and extensively reddened. Near the left corpus striatum, at the nucleus lentiformis, numerous extravasations of blood. Fourth ventricle wide. Between the lower surface of the pons and the aqueduct of Sylvius a fissure filled with fresh blood. Extensive purulent infiltration of left orbita, but no changes in periosteum, muscles, or retina. Sinuses at the base of the brain contain much dark and nearly coagulated blood. The appearances in the other organs did not show anything worth mentioning.

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16. *Some Forms of Delirium or Acute Insanity during the Decline of Acute Diseases, especially the Delirium of Collapse.*—Dr. Hermann Weber, in a paper read before the Royal Med. and Chir. Soc., commenced with the remark that he did not intend to treat on the usual delirium arising during the increase and acme of acute diseases, but on a form which occurred occasionally after the crisis, or towards the termination of such diseases, and which was attended with the phenomena of collapse, a form which he was inclined to designate as the

"delirium of collapse," and which resembled much more the mental derangement usually termed insanity than the common delirium. After having alluded to the literature of the subject, he described seven cases, which in reality were equal to nine, as in two of them there were two separate attacks of disease; and he remarked that the delirium occurred when the pyrexia and the other active symptoms had already much abated; that in all there was a feeble, mostly frequent, and sometimes irregular pulse; that in the majority the face and extremities were more or less cold, and the skin in profuse perspiration. The delirium was characterized by the suddenness of the outbreak, which almost always occurred on waking, and more frequently in the early morning. The delusions were in the majority of cases of a fixed nature, and the subjects of a gloomy kind, repeatedly traceable to the occupation of the mind just before the commencement of the illness. There were hallucinations of the senses, especially of hearing, but occasionally also of sight. The duration of the mental derangement varied from eight to forty-eight hours. The condition of the brain and nervous system appeared to be allied to anæmia; and to be connected with that peculiar shock not rarely experienced by the whole system during the decline, but sometimes also at the time of the crisis of acute diseases, and significantly termed "collapse." The writer alluded to the occasional but more rare occurrence of transitory mental derangement, different from the common, febrile delirium, during the increase of acute diseases, which might be similar to the derangement in the cases before the Society, and father to the mental aberrations occurring during the advanced convalescence. He maintained, however, that not all the mental disturbances observable during the decline of acute diseases were of one and the same nature; and considered also the peculiar delirium of insanity arising during, and at the decline of, rheumatic fever as different from the delirium here described as the delirium of collapse. Regarding the treatment, Dr. H. Weber thought that rest and the use of stimulants externally and internally, according to the degree of the collapse and the concomitant circumstances, would probably in the majority of cases suffice, but that opiates, which in this condition seemed to be well borne, even in large doses, appeared to accelerate the recovery.—*Med. Times and Gaz.*, April 29, 1865.

17. *Aphasia.*—Prof. TROUSSEAU has given this term (from ἀφάσις, speechlessness) to a particular form of paralysis causing an inability to give expression to the thoughts by speech, an affection of which he has prominently treated in his clinical lectures. In those lectures he relates the following case, which is the more valuable, as the subject of it was himself one of the most eminent professors of the French school, and who, having devoted a long life to the investigation of cerebral disease, was particularly well qualified to appreciate and record the symptoms which he experienced in his own person.

Dr. R., being confined to his house from the effects of an accident, had been reading nearly all day, and had thus fatigued his brain. He was engaged in reading one of Lamartine's literary conversations, when all on a sudden he perceived that he imperfectly understood what he was perusing. He stopped a moment, then resumed his reading, but again experienced the same phenomenon. In his alarm, he wished to call for assistance, when, to his great astonishment, he found himself unable to speak a word. He now fancied himself the subject of apoplexy, and he immediately caused his arms and legs to execute various complex movements, and found there was no paralysis. Being alone, he rang the bell, and when his servant came he could not speak a word. He moved his tongue in all directions, and was struck with the strange contrast which existed between the facility of movement of the vocal organs and the impossibility of giving expression to his thoughts by speech. He now made a sign that he wished to write; but when pen and ink were brought, although he had the perfect use of his hand, he found himself quite as unable to give expression to his thoughts by writing as by speaking. On the arrival of a physician, at the end of two or three hours, Dr. R. turned up his sleeve, pointed to the bend of the elbow, and clearly indicated that he wished to be bled. Venesection was hardly finished when a few words could be uttered. By degrees the veil seemed to be

removed, and at the end of twelve hours speech was entirely restored; or, to use Prof. Trousseau's emphatic language, "tout était rentré dans l'ordre."

Dr. Frederick Bateman relates (*Lancet*, May 20, 1865) the following case, which came under his observation:—

Wm. S., a waterman, aged 51, was admitted under my care in the Norfolk and Norwich Hospital on April 1st, with the following antecedent history. On the 9th December, after unloading the vessel in which he had conveyed a cargo of goods along the river from Norwich to Yarmouth, he went into a tavern to ask for some beer, but when he entered the house he found he could not speak. This loss of speech was not preceded by any premonitory symptom, and it was clearly unaccompanied by any other paralytic symptom, for, although speechless, he on the same evening removed his vessel from one point of the river to another, and on the following day loaded it with a fresh cargo, after which he took the train to Norwich, walking from the railway station to his home, a distance of a mile. His friends, finding that his vocabulary was limited to the words "Oh dear! oh dear!" sent for a surgeon, under whose care he continued till a few days before he came to the hospital.

State on Admission.—His condition is that of a healthy-looking man, with an intelligent countenance, looking me straight in the face when addressed, evidently understanding all that is said; but although his ideas appear to arise in great number in his brain, he is unable to give expression to his thoughts by articulated language except in the most imperfect manner. I am informed, however, that he has been slowly improving in this respect since his complete loss of speech three months ago. He has the proper use of his limbs, which are quite free from the slightest abnormal sensation. Deglutition is unaffected. The tongue is protruded straight, and he can execute all the different movements appertaining to that organ. The only features to notice in the tongue are, that the right half is slightly raised above the level of the left half and is more flabby, and that when told to protrude it he keeps it out a long time, as if from deficient memory, he probably not remembering what he had done. He is very cheerful, and does not weep from emotional causes, like persons with ordinary paralysis, nor has he that distressed countenance usually observed in the subjects of grave cerebral disease. I am informed by his relatives that some weeks after the first attack he experienced slight numbness in the *right* hand, which, however, soon passed off.

So long a time having elapsed since the attack, I have felt that little could be done in the way of treatment. He has, however, slightly improved since his admission, under the use of small doses of phosphates of iron and zinc with dilute phosphoric acid, and careful attention to diet.

Dr. B. gives the following as his conclusions respecting the pathology of aphasia:—

1. That it is probable that early observers may have confounded ordinary paralysis of the tongue from mechanical injury or disease of the hypoglossus with that loss of the memory of words and inability to give expression to thoughts which characterize aphasia.

2. That although further observations are necessary to place the pathology of this affection on a firm basis, the majority of cases recorded tend to favour the doctrine of localization in the *left* hemisphere, further investigations, however, being required to substantiate M. Broca's statement that the lesion is limited to the posterior part of the third frontal convolution. The physiologist may ridicule the notion that an organ so perfectly symmetrical as the brain can have one hemisphere possessing a function not appertaining to the other. I must, however, remind him that this is not the only singular and inexplicable fact which physiology presents to us. Prof. Trousseau, alluding to this subject, says he has never seen intercostal neuralgia except on the left side. Why is this? We know nothing about it, except that it is a symptom depending exclusively on an affection of the left side of the spinal cord.

The question of the localization of speech has now occupied the attention of the members of the French Academy of Medicine during several of their recent sittings, and still remains one of the *quæstiones vexatæ* of the day.

18. *Progressive Locomotive Ataxia.*—Dr. PAUL TOPINARD, in a recent essay which received the Civrieux prize for 1864, gives the following as his general conclusions at which he has arrived from his investigations respecting this disease:—

"3. Progressive locomotive ataxia has been included in Germany among the numerous species of *tabes dorsalis*, and even described with sufficient accuracy by Hufeland, Steinthal, Wunderlich, and Romberg. In England, Todd has marked out one of its forms with precision. M. Duchenne, in France, has given the most complete clinical description of it up to that period (1858). 4. Progressive locomotive ataxia is a morbid variety detached from the group of affections known as chronic myelitis. The precise information we possess upon it, its frequency in practice, the importance of its anatomical lesion, the combination of its two fundamental clinical characters—namely, primary functional disturbance of the cranial nerves, and ulterior locomotive ataxia—authorize its being named and described separately. 5. The anatomical lesions occupy—1st, the periphery of the cranial nerves; 2d, the posterior columns of the spinal cord through a great part of their length; 3d, the posterior roots of the spinal nerves; 4th, exceptionally, the nerves of the limbs; it is an atrophy of the nervous tubules, with hypertrophy of the intermediate elements; it represents the advanced stage of a morbid phase which up to now has escaped our recognition and our formulæ. 6. Progressive locomotive ataxia has its origin often with the other affections passing under the name of chronic myelitis. Sometimes it touches upon general paralysis. Two of its modes of termination are insanity and paralysis. In close relation with it is a malady the history of which is yet to be written, in which gray degeneration attacks the brain, the cranial nerves, the anterior columns more than, or as well as, the posterior columns, without locomotive ataxia forming any part of its symptoms. The word 'entity' is thus inapplicable to progressive locomotive ataxia. 7. The primary cause which engenders progressive locomotive ataxia operates upon the whole of the nervous system, with a preference for the medulla, just as calcareous degeneration affects the whole of the vascular system, with a preference for the valves of the heart. In making progressive ataxia a disease of the cord, we imitate those physicians who, in the latter instance, recognize mainly an affection of the heart. 8. Progressive locomotive ataxia presents itself under three forms: the first, complete or general, in which the disturbances of the cranial nerves show themselves some years before those of the limbs, or at the same time with them; the second, damaging, or paraplegic, in which there is merely deficiency. (Sometimes the ophthalmoscope or the autopsy unsuspectedly demonstrate their existence); the third, cerebral, characterized by superadded cerebral symptoms. 9. The progress of the disease is not fatally progressive; it exhibits stationary conditions of long duration, and even some spontaneous retrogressions. The spinal symptoms are generally severe at outset, and more or less apparent in the four limbs. The third or advanced period has for its principal symptom an alteration in muscular power. Up to the present time there exists no instance of a recovery from an unquestionable progressive locomotive ataxia. Death succeeds by an intercurrent disease. 10. The physician can give relief, can suspend the progress of the malady or ameliorate it. He will have thus an active part to play; in the first place he will judge from the indications, and will rest, according to the individual upon hygienic treatment, upon tonics, hydrotherapeia, sulphurous baths, mineral waters, revulsions to the spine, etc., each one of which appropriately used will give him some success. In the last place, he will seek assistance from empirical agents—that is, in fault of anything better, from nitrate of silver. Progressive locomotive ataxia rejects an uniform treatment, and up to the present time possesses no one specific remedy. 11. The locomotive ataxia in this form of disease does not coincide necessarily with an integrity of the motive power. It is dependent neither upon muscular debility, nor upon cutaneous anæsthesia, nor upon muscular anæsthesia, nor upon mixed anæsthesia. 12. The muscles are endowed with two kinds of sensibility; the one general, appreciable by means of electricity, pinching, or the bistoury when they are the seat of inflammation, etc.; the other, special (or sensorial)—the sense of muscular activity. The perception of passive movement, the knowledge of position as well as sensibility to pressure,

depend upon a complex sensibility, in which all the tissues of the limb concur. 13. Walking, in the physiological condition, is subordinate, like respiration, to two influences; the one, which commands—periodical; the other, which executes and co-ordinates. The former is the will, the latter is the reflex power of the spinal cord. Locomotive ataxia is produced whenever the reflex power is altered or diminished. 14. Locomotive ataxia, properly speaking, is marked by a truly characteristic physiognomy only in the lower limbs. Its effects in the upper limbs approach those which determine in them trembling, incomplete paralysis, and cutaneous anæsthesia. The reason is, that the reflex or co-ordinating power, of which locomotive ataxia is the functional disturbance, is physiologically less developed in the brachial than in the lumbar portion of the spinal marrow."

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19. *Infantile Paralysis.*—Dr. W. Adams mentioned (March 16), at a meeting of the Harveian Society of London, that he had frequently had to treat cases of this affection, and that in some instances he had been able to restore the power of locomotion where it had been supposed to have been irretrievably lost. Infantile paralysis came on frequently during teething, at the age of one or two years. Both legs or both arms are paralyzed suddenly or in the course of a few hours, or only one limb may be affected. Sir B. Brodie used to say that unless this paralysis is naturally recovered from in six months, it is hopeless. In three to six months there is usually the greatest amount of recovery, the rectus muscle of the thigh often being the last to recover. As to the pathology of the disease, Mr. Adams confessed that he knew nothing of it. The most recent German writers on the subject attribute it entirely to the muscles; and Rilliet and Barthez recorded only two *post-mortem* examinations. In these, as well as in the one made by Mr. Adams, no appearance could be made out to account for the disease, and children do not die of it. Consequently the cause of it is not investigated. If practitioners were but aware of this fact, they would probably make the necessary examinations. It must be remarked that natural recovery of the muscular powers may progress from six months up to three or four years, during which time a series of events takes place—namely, contraction of all the joints. Mr. Wilkinson had lately brought him a child with great contraction of the knee-joints. The muscles around the hip-joints are usually the first to recover. A child was sent him from Clifton, of the age of from six to seven, which had never stood. It had contraction of the joints, arms, legs, and trunk, and Mr. Adams was able to promise the parents of the child that it should walk in three months. Dr. Brown-Séquard had requested Mr. Adams to see a young lady, aged seven years, in consequence of paralysis of both legs, and in three months this child was able to walk with steel supports. If a child could use the psoas and iliacus muscles, it could be made to walk, and this was the practical test. It should be laid down upon the floor, and if it can draw up its knees, success is certain. With regard to treatment in the early stages, he had known counter-irritation down the spine used, but the chances were that no treatment would do much good. When the child has paralysis with flaccid muscles, rubbing and warm clothing are of use. Galvanism of both legs under water is also useful, notwithstanding that many physicians and surgeons disparaged this remedy, and said it had been tried and found to be valueless. He (Mr. Adams) used two tin boots, filled with warm water, in each of which the little patient's foot is placed, and galvanism is applied. Dr. Gull had written some valuable papers on galvanism in the *Guy's Hospital Reports*. The nutrition of the limb must, if possible, be maintained. Dr. Junod's boot for exhausting the air was once in much repute, and is now, perhaps, too much neglected. A paralytic patient of his could always warm the leg in ten minutes by this apparatus; the boot has had no bad effects, but is liable to get out of order. It is, doubtless, a most useful remedy in many cases of paralysis. In some cases of infantile paralysis the rectus muscle remains paralyzed for life, and the leg swings; but this can be compensated for by mechanical means, so as to enable the child to walk.—*Med. Times and Gaz.*, May 20, 1865.

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20. *Therapeutic and Physiological Action of Chloroform in Epilepsy.*—Dr. Wm. Murray, of Newcastle-on-Tyne, in a recent paper (*Med. Times and Gaz.*,

April 8, 1865), observes Dr. Russell Reynolds has detailed in his classical work on epilepsy the effects produced on that disease by the inhalation of chloroform till the patient is fully under its influence. He uses the chloroform thus when an attack is threatening, and at certain intervals afterwards, and concludes that when administered in this way "it may delay the attacks for a time, but it exerts no permanently good influence." The plan of treatment I have adopted (the results of which are about to be detailed) differs from the above in some important particulars, although the principle on which it is administered seems to be the same.

1st. The chloroform is inhaled in quantities so small as to stop short of inducing unconsciousness, except of the most trifling nature.

2d. It is administered two or three times daily for a period of two or three months at least.

3d. It is given regardless of the fits, never being given to ward them off, and never omitted because of their occurrence.

The principle on which it is administered is that of paralyzing the upper ganglia of the sympathetic, to induce conditions (hyperæmia) tending to unconsciousness, the very opposite of those which occur at the onset of an epileptic attack. Thus the primary influence of the drug as a stimulant to the brain, by inducing hyperæmia thereof, is brought to bear upon that organ thrice daily for a long period of time, and it is believed that there are cases of epilepsy in which this treatment must and does prove beneficial.

I should have used the NITRATE OF AMYLE instead of chloroform in some of these cases had the agent been less dangerous; for it seems to be the most powerful means we possess of exciting the heart's action, and producing results similar to those which follow paralysis of the sympathetic in the neck. When a few drops of the nitrate of amyle are inhaled, the heart's action increases by forty beats per minute, and the head, face, and neck become suffused by an intense hyperæmia; at the same time cerebral symptoms, such as throbbing and a sense of fulness of the head, indicate corresponding hyperæmia in the cranial cavity and its contents.

Dr. Murray reports several cases of epilepsy in which he has employed chloroform, and adds, from all this it appears that in accordance with the view taken of the physiological action of chloroform administered in this way, its therapeutic properties are to be relied on in cases of epilepsy where there is manifest loss of brain power. In such cases it seems to lead to increased vascularity of the head and consequent stimulation of the brain, accompanied by that excitement of the system which occurs in the very first stage of chloroformosis. It seems to do positive harm in cases where the brain is active and excitable, and in cases where the mental faculties are of average power and unimpaired no appreciable effect is produced on the disease.

In none of the cases in which the remedy was tried for a lengthened period has its use been followed by injury to the mental faculties.

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21. *Treatment of Diphtheria with Ice.*—Mr. J. DUGGAN states that he has successfully employed ice in the case of a man affected with diphtheria. He ordered the patient to keep constantly swallowing small particles of ice, and also to keep continually sucking and melting icicles in his mouth until he should see him again on the following day, advising him to carry out his intentions most assiduously. On visiting him the evening of the next day "I was agreeably surprised," he says, "to find him much improved, the tensive swelling of the throat to a great extent subsided, and the inflammation of the internal fauces and the tumefaction of the velum pendulum palati (to which was attached the peculiar adventitious membrane) greatly reduced. I impressed upon him to continue using the ice as usual. As he complained of being weak, I gave him a mixture of infusion of bark and tincture of snakeroot, to take two tablespoonfuls three times a day, and to have an abundance of fresh milk and beaten eggs for food. He pursued this course of treatment for a few days, and, to my gratification, ultimately recovered from this dangerous disease.

"Although this is essentially a blood disease, yet the application of cold to the internal parts of the throat will be found of much benefit and a source of great

comfort to the sufferer. Of course it will be necessary to prescribe tonics and nutritious food to support the weakened system, and mild alteratives to improve depraved secretions. This mode of treatment—viz., by the constant swallowing of ice—may not be novel for aught I know, but I have never met it in books. To the practitioner where ice can be got at any moment, I would advise a trial in this and other kindred diseases of the throat, as it has the advantage of being harmless and simple in its action."—*Medical Press*, April 26, 1865.

22. *New Specific Remedies for Gonorrhœa.*—Dr. Thos. B. Henderson introduces (*Med. Times and Gaz.*, June 3, 1865) to the profession two new specific remedies for gonorrhœa. The first is the oil of yellow sandal wood, which is obtained by distillation from the wood of *Sirium myrtifolium*, an East India tree. Dr. H. says: "In my experiments with this drug, I have found it perfectly innocuous even in large doses. From twenty to forty minims three times a day, diluted with three parts of rectified spirit, and flavoured with ol. cassiæ or ol. cinnam., is the ordinary formula I employ; water and a confection after. In cases of the disease at the first, second, or third stage, in susceptible persons, I have often seen the most marked suppression of the discharge within forty-eight hours. It has the great advantage of being a pleasant medicine, not liable to cause sickness, agreeable to the taste, and grateful to the stomach. It is a medicine, as to efficacy, in my opinion, equal, and frequently superior, to bals. copaib. or cubeb pepper. I have often succeeded with it when both had been fairly tried and failed. Besides, it is convenient and portable; and if the patient is delicate, or in bad health, or the system disordered, the possession of a remedy which will act as a stomachic medicine and cure the disease is, I think, to be highly valued. I have used it in many cases during the past five years. I have no theory to offer as to its mode of acting. My experiments have been numerous, but entirely of a practical character. The odour of the drug is slightly perceptible in the urine. Its action on the urethra is observed, in susceptible cases, within a few days after beginning its use. Almost every druggist keeps it for perfumery purposes."

The other remedy is the gurjun or gurjun balsam, or wood oil, the product of the *Dipterocarpus turbinatus*, an immense tree, a native of India. Dr. H. states that he has only used this "in cases where copaiba had been fully tried and failed. In every case it was successful within a week. No symptoms of inconvenience in any of the cases were produced. I gave it in what may be called large doses—a teaspoonful two or three times a day, uncombined. I have not been able to investigate its action further, as my supply became exhausted, and it is not easily procured in this country. I am thoroughly convinced it is an excellent medicine."

Dr. O'Shaughnessy employed it according to Dr. Waring (*Manual of Practical Therapeutics*) in numerous cases of gonorrhœa and gleet; and the results seem perfectly conclusive that in the treatment of these and other affections of the genito-urinary system the essential oil of gurjun is nearly equal in efficacy to copaiba. It generally causes a sensation of warmth in the epigastrium, eructations, and sometimes slight purging. It greatly increases the quantity of the urine, which has a terebinthinate odour. Dr. O'S. found that some obstinate cases of gonorrhœa and gleet, which had long resisted copaiba and cubebs, were cured by this remedy. E. J. Waring writes: "In the few cases I have had an opportunity of trying it, the results have been uniformly satisfactory. It might be advantageously introduced into English practice as a cheap and efficient substitute for copaiba. The dose is ten to fifteen drops thrice daily."

23. *Resolvent Properties of Fresh Parsley Leaves* (*Petroselinum sativum*) *in Engorgement of the Female Breasts.*—Dr. M. Neucourt highly extols (*Revue de Thérap. Méd.-Chirurg.*, June, 1865) the resolvent properties of the fresh parsley leaves in milk engorgements of the breasts. He relates three cases in which he resorted to this remedy with success. He had the breasts covered with fresh parsley leaves, and the application renewed three times a day.

SURGICAL PATHOLOGY AND THERAPEUTICS, AND OPERATIVE SURGERY.

24. *On Osteo-Myelitis Consequent on Gunshot Wounds of the Upper and Lower Extremities, and especially on the Treatment of Stumps affected with Osteo-Myeletis after Amputation necessitated by such Injuries.*—Mr. THOMAS LONGMORE read a paper on this subject before the Royal Medical and Chirurgical Society, Feb. 28, 1865. The author commenced his communication by noticing the particular interest which had been excited amongst military surgeons, especially French surgeons, during the last few years in the subject of osteo-myelitis, or endosteitis, as it is called by some writers, after gunshot wounds of the extremities, and of its proper treatment. The interest arose, not from any belief that a difference existed between the nature of the inflammation of the medullary tissue when developed after gunshot injuries, and the corresponding inflammation occasionally seen after the ordinary injuries and amputations of civil life, but from the comparative frequency of its occurrence after gunshot injuries, and after amputations consequent upon them, together with its severe and obstinate character, often in men of previously sound constitutions, in military practice, contrasted with the comparative rarity of its occurrence in sound constitutions in civil practice. After the Crimean campaign, Dr. Valette, a French military surgeon, who had one of the large hospitals at Constantinople under his charge during the period of the war, and again, since the Italian campaign of 1859, M. Jules Roux, the principal surgeon at the large marine hospital of St. Maudrier at Toulon, had both written at considerable length on the subject. Dr. Valette's observations were chiefly directed to this inflammation in its earlier and more acute stages, as witnessed amongst the wounded sent directly after the battles of Alma and Inkerman, amongst whom it had produced the most fatal consequences. The author remarked that in perusing Dr. Valette's reports, the conclusion could scarcely be avoided that the so-called osteo-myelitis, in a large number of the instances referred to, must have been truly cases of pyæmic poisoning, and that in all, the symptoms of the osteo-myelitis must have been greatly aggravated by circumstances tending to the development of pyæmia. Dr. Valette found all attempts to check the disease ineffectual, and came to the conclusion that all resections and amputations for the effects of this inflammation after gunshot fractures should be abandoned, and exarticulations substituted, the wounded being scattered at the same time in tents as widely as possible. M. Jules Roux's observations were made on the disease in its more chronic condition, and he was led to advocate the same views with regard to the necessity for exarticulation as had been advocated by Dr. Valette. M. Roux had under his care about 2000 soldiers who had been wounded in the Italian campaign, a considerable number of whom presented diseased conditions demanding consecutive amputation or other surgical interference. At first M. Roux practised amputation, but with such unfavourable results that he was induced to try exarticulation in similar cases instead. This operation proved remarkably successful. There was no death out of twenty-two successive cases, among which were four cases of exarticulation at the hip-joint. In a memoir on the subject which was read before the Imperial Academy of Medicine at Paris in 1860, M. Roux argued that when osteo-myelitis after gunshot wounds assumes a chronic form, amputation generally only takes away a portion of the inflamed bone, and in consequence of this incompleteness in the operation the disease is aggravated in the remainder. Hence, he asserted, the failure of secondary amputations for gunshot wounds of bones; and hence, also, in his opinion, the preference which ought to be given to exarticulation, or removal of the whole of the diseased bone, when a surgical operation becomes indispensable. The views of treatment propounded by M. Roux has led to several protracted discussions at the Academy of Medicine at Paris. They were particularly analyzed in an elaborate discourse by Baron Larrey, which he afterwards published. In this discourse Baron Larrey arrived at certain conclusions,

six in number, with the general terms of which the author said he believed most English army surgeons would agree. The following are the conclusions referred to: 1st. Osteo-myelitis after gunshot wounds is more frequent than has been hitherto supposed; but is not inevitable, and in most instances is a means of cure. 2d. It may either be limited to a given point of the bone, extend itself partially, or invade the whole of the bone more or less quickly. 3d. Every rational mode of treatment must be adopted in the first instance. We are encouraged to do so because we know osteo-myelitis is susceptible of spontaneous cure. 4th. Sometimes it necessitates resection, and sometimes consecutive amputation, and sometimes, in certain cases, exarticulation is preferable: 5th. The existence of osteo-myelitis is sufficient to explain the want of success which occasionally follows partial operations in bones affected with this inflammation. But, 6th. It does not justify the too exclusive proposition in surgery, that resection of joints and amputations in the shafts of bones are to be abandoned for exarticulation in all such cases. The author of the present paper thought, however, that the settlement of the question of the proper treatment of chronic osteo-myelitis might be carried a step further in precision, especially in cases where want of success had seemingly followed partial operations on account of its presence. Many cases, he stated, came before military surgeons, in which, after amputation had been performed in continuity for gunshot injuries, or for the effects of osteo-myelitis consequent upon them, the portions of the limbs left afterwards presented such diseased conditions as to necessitate further surgical interference in order to avert fatal consequences from the patients. In these cases, where the morbid state of all the tissues is manifestly due to the continued osteo-myelitic action subsequent to the amputation, what is the course to be pursued? The arguments of M. Jules Roux would urge most forcibly in these cases, that exarticulation is the only treatment that can scientifically be adopted; and even according to the conclusions of Baron Larrey these would appear to be the "certain cases" to which he refers in his 4th conclusion, where curative treatment in the first place and consecutive amputation in the next place having failed, disarticulation would be the preferable course to follow. The author had been led to adopt a different conclusion; and in order to show to the society the grounds on which his conclusions had been based, he called attention, firstly, to certain preparations belonging to the museum of the army medical department from cases in which exarticulation had been performed, or death had occurred on account of osteo-myelitis; and secondly, to the histories of some similar cases in which a cure had been effected without exarticulation being resorted to. The first three preparations exhibited consisted of the upper portions of three humeri. In each of these the history was—amputation at the middle of the upper arm for a gunshot wound, and exarticulation at the shoulder within a year afterwards for osteo-myelitis. The fourth preparation was one of the upper part of the femur which had been removed from the patient after death. Amputation had been performed in the middle of the thigh for a gunshot wound in India, and the patient died about a year afterwards from the effects of osteo-myelitis in the stump. There was every reason to believe that in all these cases the osteo-myelitis was due to the shock of the original gunshot injury, and not to any peculiarities in the amputation or other causes. To show that the simple shock of a gunshot wound is capable of giving rise to general endosteitis in a bone, another preparation was exhibited in which the entire shaft of the femur had been subjected to the action of this inflammation. In this case a musket ball had only penetrated the soft tissues, and struck the bone, without producing complete or even a partial fracture of its substance. Another preparation of the upper half of a humerus was exhibited from a case in which the author had performed exarticulation for osteo-myelitis four years ago, before his attention had been turned to other modes of treatment. In this case the previous amputation had been performed for the effects of a kick from a horse, and the preparation was exhibited to show that the consequences of the osteo-myelitis were exactly similar to those which had occurred after the gunshot injuries. All the preparations above named showed, that in each case, extensive necrosis of the shaft had resulted from the endosteitis with which it had been affected; that the necrosed portions were well-defined within fixed

limits; that in no instance was the necrosis continued to apophysis, although in all the cases the apophyses were more or less in the condition known by the term "osteo-porosis;" and that the sequestrated portions of the shafts were surrounded by copious shells of new bone, as in cases of ordinary necrosis. Three cases were then related in which amputation at the middle of the thigh had been followed by osteo-myelitis in the stump, but in which cures had been obtained without exarticulation. The amputation had been performed in two of these cases for gunshot wounds, in the third for the consequences of a compound fracture from a fall. In each of these cases the removal of the sequestra left by the osteo-myelitic action was effected by surgical interference, and a sound and healthy condition of the stump resulted. In the case first described, the patient at the time of his admission into hospital at Fort Pitt, from India, had suffered so severely from the effects of the prolonged irritation to which he had been subjected, and the thigh-stump was so extensively diseased throughout, that at a consultation of the staff of the hospital the removal of the stump at the hip-joint was determined to be the only course which held out a fair hope for the patient's recovery. Fortunately, before this serious operation was undertaken, a study of the preparations laid before the society, and some others of a similar kind, led the author of the paper to determine, as a preliminary measure, to open freely the cicatrix of the amputation-wound, and to take steps for removing all pieces of necrosed bone that might be found within the remaining portion of the shaft. The operation was so conducted that, if necessary, it could have been converted at the time into amputation at the hip-joint, or this formidable operation be reserved for a subsequent recourse, if the removal of the necrosed bone did not lead to cure. Complete success, however, attended the first effort: the dead portion of the shaft, which reached up to the trochanters, was extracted, together with some smaller detached fragments. The patient rapidly improved in all respects afterwards, and eventually walked from the hospital with an artificial limb applied to the stump, which had become perfectly sound. The second and third cases mentioned were those of soldiers, who had suffered amputation of the thigh for gunshot wounds, and from subsequent endosteitic necrosis in the stump. In both cases the necrosed portions of the shaft were removed by gradual traction through openings in the line of cicatrix of the amputation-wound. In one of these instances in which the man's limb had been smashed by a round shot just above the knee, at Lucknow, in 1857, an opportunity was afforded of examining the state of the stump five years after the date of the amputation. The stump was then thoroughly sound, and the man able to perform hard work and long journeys by wearing an artificial limb upon it. The motions of the hip-joint were perfect. The author of the paper stated his present conviction to be that if similar steps had been adopted, and the necrosed sequestra removed, in the instances brought before the society in which exarticulation at the shoulder had been performed by himself and others, the stumps might have been similarly preserved; and that in the instances of the femoral stump, and the femur affected with endostitic necrosis, the lives of the patients might probably have been saved by such a proceeding. In cases where amputation had been previously performed, the amputation cicatrix should be opened for the removal of sequestra, or, if more convenient, the stump could be opened from other directions; where no previous amputation had been done, the sequestra should be extricated as in ordinary cases of necrosis. Though not a matter of such importance to avoid exarticulation of a humeral stump, as it is of a femoral stump, owing to the danger to life in the latter operation, and the important use of a thigh-stump for the adaptation of mechanical contrivances for assisting in supporting the weight of the body, yet the author maintained the preservation of a humeral stump to be of great value to the possessor, especially when the power of compressing it to the side is retained. An osteo-porotic condition of the articulating heads of the bones, corresponding with the condition shown in the preparations, will not interfere with a successful result if the necrosed sequestra be completely removed. The author alluded to a case in which he had removed a foot at the ankle-joint, in which, on sawing off the two malleoli, the extremities of both the tibia and fibula were seen to be extensively affected with fatty osteo-porosis: yet the ends of these bones became

firm and solidified under an improved condition of general health, the removal of the source of irritation which had previously existed in their immediate neighbourhood, and the stimulus of use. There could be no doubt that the head and neck of the femur in the case of the thigh-stump which had been preserved by the removal of the sequestra, the largest of which was exhibited to the society, was in a state of osteo-porosis at the time these sequestra were extracted. The amount of irritation to which the bone had been subjected, the length of time that had elapsed, together with the conditions observed in analogous cases where the opportunity of examining the conditions had been afforded, sufficiently established the fact. The author concluded by observing, that while adopting generally the views of Baron Larrey, before quoted, in reference to the nature, progress, and treatment of osteo-myelitis after gunshot injuries, the following appeared to be fair deductions from the facts and observations he had brought to the notice of the society: 1st. In gunshot injuries of bone, it will be found for the most part—what might be anticipated from the intimate connection which exists between the periosteal and endosteal investments of the bony tissues, and from the violent general mischief effected by the stroke or passage through them of a projectile—that all the structures participate not only in the immediate local destruction, but also in the extended inflammation which follows, whether the inflammation after a time subsides, and terminates in repair, or whether it continues in a chronic form. 2d. There exists this difference between the inflammation of the endosteum and that of the periosteum: that of the endosteum has a special tendency after gunshot injuries to degenerate into a chronic condition analogous to that of suppuration in other tissues, to extend itself along the cancellated structure, and thus to produce disintegration and death of the bony substance; that of the periosteum, at the same time, will exist only to such a degree as to cause it to exert a protective influence by the formation of new bone around the diseased tissues, just as in ordinary cases of necrosis from other causes. 3d. If amputation in continuity be performed while the endosteum is suffering from the inflammatory irritation excited by the violent injury to which the whole bone has been subjected, especially when this has assumed a chronic form, the endosteitis will most probably still pursue its course, even though the divided soft parts may at first become healed, slowly inducing death, more or less extensive, of bony tissue, and, in time, the usual consequences of such a condition throughout the whole stump. 4th. The morbid condition of the endosteum does not usually extend from the shafts of bones into their apophyses. 5th. When amputation has been followed by these consequences, exarticulation should not in any case be resorted to for the removal of the diseased stump until the effect of complete extraction of the dead bone by proper surgical interference has been ascertained. 6th. Experience shows that, even although a patient's constitution may be greatly impaired by the prolonged local diseased action to which it has been subjected; and though there may be every reason to conclude that the articular extremity of a bone is in the condition understood by the term "osteo-porosis," yet the complete removal of the endosteitic sequestra may speedily be followed by restoration of the general health, and by a condition of the stump, so sound and firm, that it may be applied to any purpose of utility for which, according to its length and position, it may be competent.—*Med. Times and Gaz.*, March 11, 1865.

25. *Treatment of Aneurism by Lead.*—Dr. G. Owen Rees relates (*Lancet*, March 18, 1865) an interesting case of aneurism illustrative of a new method of cure, viz., by introducing lead into the system with the view of facilitating the coagulation of the blood, a full diet being at the same time given.

The subject was a man 27 years of age, admitted into Guy's Hospital on the 26th Oct. 1864, with popliteal aneurism. The patient stated that seventeen days before he was out walking, when on standing still, he felt pain under the left knee. The pain was relieved by flexing the knee-joint. He then observed a tumour over the seat of pain, which has increased in size up to the present date, but has never caused him much trouble. He has ulcers and varicose veins on both legs, the left being the worse. He is a strong, healthy-looking man, single, and a teetotaller, and has always enjoyed good health. Has worked very hard

lately. The heart-sounds may be considered normal, if we except a slight prolongation of the second sound. The bowels are generally costive. A distinct bruit is heard over the seat of the aneurism, and pulsation is well marked.

Mr. Poland's description of the tumour is as follows:—

"The aneurism was of the size of a duck's egg, and its contents were perfectly fluid. The walls were excessively thin, so that it was feared rupture would take place. Arrangements were made to commence compression at once, and a failure ensued. Deligation of the artery to be performed. Pressure on the artery above readily commanded pulsation, and was attended by complete emptying of the sac without apparent trace of coagulum. It was considered that the opening of the artery into the sac was of large diameter."

Oct. 29th. Ordered three grains of acetate of lead and one grain of opium powder three times a day; to have full diet, and a chop for breakfast.

Nov. 1st. A slight blue line on the gums.

4th. Complains of loss of appetite, and has frequent calls to stool; the bowels, however, do not act.

5th. Ordered five grains of acetate of lead and one grain of opium powder three times a day.

18th. He complains of loss of appetite. His condition is much the same as on the 4th. Ordered an ounce of castor oil immediately.

24th. The swelling in the popliteal space has been gradually hardening and enlarging, apparently owing to the deposit of fibrin within the sac of the aneurism.

26th. Ordered two drachms of castor oil immediately.

Dec. 2d. Is obliged to discontinue taking the pills on account of the colic produced. The pulsation in the tumour is very much less.

3d. Feels easier; has less pain in stomach. Ordered the magnesia and salts mixture twice a day.

5th. Slept badly, having pain in his stomach; his appetite has much diminished.

12th. The pulsation has ceased, but the tumour is larger and more tender, and he cannot straighten his leg on account of the mechanical obstruction caused by it.

16th. Mr. Hilton found that by pressing the femoral artery he could affect the sac, but thought the aneurism was almost cured. The patient has now a clear, well-defined blue line on the margins of the gums, and feels no pain in the stomach. The articular arteries of the left knee-joint can be seen pulsating very distinctly.

17th. The tumour which almost fills the popliteal space, is diminishing in size. He can nearly straighten his leg. The left leg is flabby, and swells if he stands much upon it, and it measures two inches more in circumference than the right.

20th. The tumour is fast diminishing in size.

31st. He has left the hospital to return to his work.

On January 17th he came to the hospital to be examined by the surgeons, and was seen by nearly the whole surgical staff, amongst the rest by Messrs. Cock, Hilton, and Birkett. He was considered to be perfectly cured. He states that he cannot walk far without feeling a numb sensation over the calf of his left leg, circulation by anastomosing branches being not yet freely established. He has been able to do his work. There is still a clear well-defined blue line on the margin of the lower gum; the upper is less affected. There is also some enlargement in the popliteal space, which he feels somewhat inconveniently when walking.

It will be observed that the doses of lead were large and continued. Thus three grains of the acetate were given three times a day for six days, and then an increase was made to five grains, a grain of opium being given with each dose. This five-grain dose was continued for twenty-six days. With regard to the pains in the abdomen, they never amounted to colic, and my surprise is that the patient did not suffer more. His attention was directed to the probable occurrence of such pains, and latterly he was inclined to exaggerate them. Though rest was enjoined, the patient would not submit to it. He walked about the ward as it pleased him, and, I am informed, danced on one occasion for the

amusement of his companions. It is worthy of remark that when the lead had been taken for three weeks the aneurism had hardened very obviously, and my belief is that we might be content to discontinue the lead should an aneurism begin to change as above described. The system is charged with the metal, and deposit once begun, we may fairly expect it will continue to the filling up of the sac.

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26. *Aneurism Cured by Pressure on the Aorta under the Influence of Chloroform.*—Mr. Heath, of the New Castle Infirmary, in commenting on a case of this, remarks:—

"My case was a very unfavourable one, the aneurism being large, the man 50 years of age, very timid and nervous, fat over the belly, and of soft lymphatic temperament. The coverings over the aneurism were thin, and at one point threatened rupture of the sac in no very long time if the impetus of the blood were not stayed.

"Pressure was twice applied to the aorta and origin of iliac without success previously to the final triumph. On the first occasion the man was five hours under chloroform, on the second nearly seven, on the third from half-past nine in the morning until seven in the evening. I was satisfied that pressure would cure the disease, and that sufficient time to allow of consolidation of the large mass of blood was all that was required.

"Pulsation returned as strongly as ever after each of the unsuccessful attempts.

"I have now waited two months, and the aneurismal tumour has almost disappeared. Being assured, therefore, of the reality and permanence of the cure I purpose making the case public, probably by bringing it before the Medico-Chirurgical Society in London.

"We are scarcely yet in a position to say what is the precise change in the contents of the sac in these cases which leads to a cure.

"I have long observed that in aneurisms cured by pressure, the ultimate change has often taken place with great rapidity in my own practice usually, in consequence of greater attention being paid to the application of the pressure, which has consequently been kept on more effectively, and so entirely to arrest pulsation; then almost suddenly an aneurism, which has been under treatment for three weeks, has become consolidated in a few hours, no apparent change having taken place in it previously.

"I was particularly struck with this in a case of *diffused traumatic* aneurism of the anterior tibial artery cured by pressure on the femoral some eight or nine years ago, in my practice at the infirmary here. After some three weeks' trial of pressure in this case, without any change in the condition of the disease, I was about to give up the plan in despair, knowing, too, that surgeons generally held diffused aneurism to be incurable by pressure. Before relinquishing the treatment, however, I determined to make a strong effort to succeed, and by personally superintending to a considerable degree the application of the pressure, its efficiency was much increased, and the pulsation for some hours entirely stopped; consolidation of the aneurism followed. Probably coagulation of the blood is the first change, afterwards contractile changes in the clot and absorption of the liquid parts. Whatever may be, however, the precise nature of the internal changes, no one can now, after Dr. Mapother's case and mine, doubt the efficiency of the plan.

"'The rapid cure of aneurism under chloroform,' must tend to extend the pressure treatment over a wide area in every sense, and leaves less ground than ever for the advocates of the knife to stand upon. It affords me great satisfaction that the third case of the kind should have occurred in the hands of a Dublin surgeon, the profession being already so much indebted to the Dublin school for the introduction of the pressure treatment."—*Med. Press*, April 26, 1865.

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27. *On the Combination of Distal with Proximal Compression in Certain Cases of Aneurism.*—J. M. O'Ferrall, Chief Surgeon to St. Vincent's Hospital, in a clinical lecture delivered at St. Vincent's Hospital, March 10, 1865; re-

marked, "I have long since been of opinion that compression of an artery on the distal side of an aneurismal sac should precede or accompany that on the cardiac side of the aneurism. I have often observed arrest of pulsation easily accomplished, attended at the same time with a flaccid state of the sac; but I have also remarked in such cases that the moment the pressure ceased the sac filled and throbbed as before. The formation of the coagulum is thus desirable as the first step to consolidation. A half empty sac is the ready recipient for the slightest thready current that can follow the cessation of the compressing force on the cardiac side. It, therefore, appeared to me advisable to interrupt the current only when the sac was full of blood. These considerations, together with the knowledge of the fact that ligature of the artery on the distal side has sometimes cured an aneurism when the upper or cardiac portion of the vessel could not be reached, made me resolve to try this expedient whenever a fair amount of pressure was not followed by success. From what I have observed, I am inclined to think that cessation of pulse in a sac which suddenly diminishes in size and becomes flaccid is less likely to be followed by a permanent cure, whatever time may have been occupied in the compression, and that a sac which retains its volume, and is, moreover, full of coagulum, is less likely to be refilled, however short the duration of the compressing force.

"When the supply is completely cut off by ligature of the trunk, I believe that the danger of relapse from refilling of the sac by collateral sources is more likely to occur when the sac collapses and becomes flaccid at the moment of deligation than when its dimensions are unchanged. This firmness of the parietes of the sac is always considered favourable to the success of the operation, as implying the presence of fibrinous deposits, whether we attribute them to stasis of the blood or to inflammatory exudation, as suggested by the researches of that distinguished surgeon, the late Dr. Abraham Colles. I have no doubt, however, that whether a sac be filled by fibrinous deposits of some duration, or by coagulum recently formed, that a full sac is very influential in preventing the ingress of blood from a compressed artery above, or collateral branches from below; the compression below the sac need not, in some cases, last more than a few minutes before the current above is stopped. If, on making the pressure above and arresting the pulsation the sac remains full, the object is attained, and time is merely required to allow the blood then liquid to coagulate in the sac. In other cases, it may be prudent to continue both compressions for a longer time. Three cases have already been treated on this plan with success. The first was published by me in the *Dublin Quarterly Journal* for November, 1846."—*The Medical Press*, March 15, 1865.

28. *Aneurism by Anastomosis of the Scalp treated successfully by Setons and Ligature of Common Carotid.*—Mr. Geo. SOUTHAM related to the Royal Med. and Chirurgical Society (March 14th, 1865) the following case:—

The patient, a married female, aged 28 years, had been suffering from the disease for upwards of eight years. She became an in-patient of the Manchester Royal Infirmary in May, 1864. The temporal artery and its branches, with the exception of those distributed around the eye and forehead (which, though visibly distended, were not pulsatile), were much enlarged, some of them almost to the size of the little finger, and communicating to the hand a distinct arterial thrill. The occipital artery and its branches were also similarly affected, though in a less degree. Pulsation was only slightly checked by pressure on the trunks of these vessels, but was completely suspended by compression of the common carotid. An ulcer had formed over the parietal protuberance, which had bled rather freely on several occasions. An attempt was made to remove the lint from the ulcerated surface; but arterial hemorrhage supervened to so great an extent that the bandages were immediately replaced. On the following day, having taken the precaution to have the requisite appliances for the arrest of hemorrhage at hand, the compress was removed in the presence of several members of the hospital staff. Profuse hemorrhage followed from the ulcerated surface, which occupied a space of about an inch and a half in diameter. Pressure with the fingers failed to stop the effusion of blood, escaping as it did from countless sponge-like orifices. Lint steeped in a solution of perchloride of iron was also

applied, and the carotid compressed: but the blood continuing to flow, with the consent of his colleagues, Mr. Southam proceeded to place a ligature on the trunk of the common carotid, which had the desired effect. Seven days after the operation the vessels of the scalp were soft, flaccid, and apparently bloodless; but very feeble pulsation could be felt in the course of the temporal artery. Four setons of worsted, about four inches in length, were now passed through the vessels, one across the temporal fossa, the others through the parts of the scalp where the vessels were most distinct. The week following, some of the vessels near the original sore were found distended, and slightly pulsatile. Three setons were inserted through them, and another about a fortnight afterwards at the posterior part of the occiput, where a vessel about an inch and a half in length could be distinctly traced pulsating slightly. From this period the case proceeded satisfactorily, and on the 12th of August she left the hospital quite well, with the exception of a small ulcer at the back of the ear, which was the remains of a slough that had taken place in that part. At the end of December there were no signs of any return of the disease. The author remarked that the success of the plan of treatment adopted in the above case afforded a prospect of bringing this hitherto unmanageable complaint more effectually under the control of the surgeon. At the time of the patient's admission into hospital, the disease had arrived at a stage when prompt measures were absolutely necessary for the preservation of life. Accordingly, on the supervention of hemorrhage, ligature of the carotid was immediately resorted to. But the unfavourable results which have frequently followed deligation of the carotid for aneurism by anastomosis of the scalp induced the author not to rely solely on that method of treatment; and the further progress of the case showed that if other means in addition had not been employed, no permanent benefit would have resulted from the operation. This need excite no surprise, for the operation to be successful must either permanently cut off the circulation through the diseased vessels, or lead to their obliteration—conditions which, however probable when the disease is confined to a single vessel, and assumes the ordinary form of aneurism, are not likely to follow when several are affected, as in the present case, involving the entire temporal system, with its arteries, veins, and capillaries. For the blood in the vessels after deligation does not coagulate, but readily finds its way into the general circulation, and the vessels remaining unchanged become again distended as soon as the circulation through the anastomosing branches is re-established. But, despite these drawbacks, deligation, even when not required for the suppression of hemorrhage, has its advantages; for the temporary interruption which it causes to the circulation through the diseased structures affords a favourable opportunity for the application of other remedies. Setons were therefore resorted to as soon as there were indications that the scalp was supplied with blood sufficient for reparative purposes. They were applied at intervals wherever any return of pulsation showed itself. It is unnecessary to dwell on the futility of trusting to setons only in the treatment of these cases. They have so repeatedly failed that their success in the present instance must be attributed to the quiescent state of the circulation produced by the ligature of the carotid. In confirmation of this view, the author referred to the case of a young lady who was under his care several years ago, whose index finger and thumb had become, through enlargement of the vessels, twice the natural size. Some of the vessels were in circumference as large as goose-quills, and gave a livid-bluish appearance to the fingers. Not the least pulsation or arterial thrill could, however, be discovered; and the vessels could be partially emptied of their blood by pressure. Three fine worsted setons were passed from the hand to the apex of the finger. Others were inserted at intervals. At the end of six months all evidence of the disease had disappeared. Deligation of the arteries, therefore, prior to the insertion of setons, does not appear necessary in all cases of aneurism by anastomosis. The disease is an affection of arteries, veins, and capillaries, varying in its characters according to the extent to which each of these structures is implicated. Deligation, therefore, seems to be required where the arterial tissue is principally involved, or where the enlargement of the capillaries has taken place to such a degree as to enable the force of the heart's action to communicate its impulse

through the capillaries to the blood circulating to the veins. Similar considerations will also determine the extent of deligation, which, except where severe hemorrhage occurs, need, in the majority of cases, only be applied to the smaller arteries. Though setons were employed in the case now related, yet galvanism, the injection of perchloride of iron, and other similar agents, may, in some instances, perhaps, be advantageously substituted; and even the risks attending ligature of the arteries may, by instrumental or digital compression, be occasionally obviated.

Mr. C. H. MOORE said the ligature of the carotid in this case was not for the cure of the disease, but for the arrest of excessive arterial hemorrhage. It was quite a different question whether such aneurisms required ligature of the vessel for their cure. In some it would not be necessary; in others the predominance of large arteries might, perhaps, be so great as to demand the operation. He had seen a case in which the tumour was as large as that described by the author in which (under Mr. De Morgan's care) cure had been effected by setons repeatedly passed, by needles, over which were placed caoutchouc rings, and by threads carrying perchloride of iron. By these means the tumour became so much less that the patient could leave the hospital. Five years later he came under the care of Mr. Nunn. He then had an overlap or fold of skin in the position of the tumour, but no trace of the former disease. There was an abscess, of the size of two eggs, which occupied the site of the tumour Mr. Moore then referred to vascular tumours of the scalp in children, which sometimes attained a formidable size, and then occasionally attempts to cure them were followed by inflammation and death. He had had no experience of tying the carotid in such cases, but when a large vessel was open and it was impossible to tie it or the vessels entering the tumour one after another, it would be necessary to tie the main trunk.

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29. *The Surgical Treatment of Certain Cases of Acute Inflammation of the Veins.*—Mr. HENRY LEE read (May 9, 1865) a paper on this subject before the Royal Medical and Chirurgical Society.

He stated that in Mr. ARNOTT's paper on "Inflammation of the Veins," published in the fifteenth volume of the *Medico-Chirurgical Transactions*, he had drawn the inference that the dangerous consequences of phlebitis bear no direct relation to the extent of the vein which is inflamed. He had there proved, by an excellent collection of cases, and by his observations on those cases, that death in cases of phlebitis does not take place from the inflammation extending to the heart, but from the entrance of some morbid product into the general circulation (pp. 44 and 61). In a paper by Mr. Lee, published in the thirty-fifth volume of the Society's *Transactions*, he had endeavoured to show that the material which obstructs the cavities of veins in cases of phlebitis is derived from the blood itself, and is not in the early stages of the disease a secretion from the lining membrane of the vessels; that the veins become extensively inflamed only in cases where coagula have previously formed; and that the purulent-looking fluid, often found in the cavities of inflamed veins, is derived from the changes which, under the circumstances, take place in the fibrin of the blood. The distinction which he wished to establish between the process by means of which fibrin is deposited from the blood, and that by which lymph is secreted from the lining membrane of a vein, was of primary importance, not only with regard to the pathology of this class of diseases, but also with regard to their surgical treatment; for it must be obvious that if the material which occupies the cavities of the vessels in cases of phlebitis were secreted by the inner coats of the veins, it would adhere firmly to that membrane, and would be found lining equally the whole circumference. It would not be displaced by the force of the circulation, nor by any other mechanical means likely to be employed. Moreover, the morbid process would extend by continuity of action, and would not be arrested by any surgical interference. If, on the other hand, the material found in the veins were derived from the blood, it might be expected to adhere slightly only to the walls of the vessels, to be attached to one part only of those walls, and to be removed easily by any mechanical force. It would be deposited in uncertain quantity, and at irregular intervals, leaving portions of the lining

membrane between those intervals free from deposit, and of its natural appearance. The deposit would often, as had actually occurred in some of the cases related by Mr. Arnott, terminate abruptly at the entrance of a fresh vessel; the reason of this abrupt termination being, as it appeared to Mr. Lee, the greater velocity and force of the circulation in the common trunk than in that which is partially obstructed. Now, the appearances actually observed on *post-mortem* examinations in cases of phlebitis all belonged to the latter and not to the former class, and the conclusion necessarily followed that the disease extends, as far as its severer symptoms are concerned, not by continuity of action in the lining membrane of the vessels, but by means of their contents, often in a more or less perfectly coagulated state. If that were the true course of the fatal symptoms in phlebitis, it appeared surprising that more attempts had not been made to arrest the progress of the disease by surgical treatment. Such attempts, however, had not been entirely wanting. Hunter remarked that when inflammation takes place beyond the orifice (of a vein) so as to alarm the surgeon, he should immediately make a compress upon the vein at the inflamed part, to make the two sides adhere together; or, if suppuration has taken place, then the compress must be put upon that part of the vein just above the suppuration.[1] Now, as lymph was not effused in the early stages of phlebitis from the lining membrane as a secretion from its inner surface, the adhesion produced by Hunter's method of treatment could be formed by coagulum of blood only. This would not, under ordinary circumstances, become organized; it would adhere to one side only of the vessel, and it would constantly be liable to become displaced. Such a bond of union, although it might for a time prevent the morbid contents of a vein from entering the general circulation, could scarcely be looked upon as affording a permanent bond of union between the sides of the vessel. In cases where the affected vein is seated superficially, a much more certain and effectual way of closing its canal and of barring the entrance of its contents from the general circulation might be adopted. This method, which, when properly performed, Mr. H. Lee believed to be free from danger, was adopted in three out of four of the following cases. The fourth case was given as an illustration of Mr. Hunter's method of treatment. It would, the author thought, be obvious that, although Mr. Hunter's method might, perhaps, have been successfully adopted in the first case, it could not have been used with any reasonable chance of success in the second and third. Four cases were then read in which, in severe cases of phlebitis, the current of blood was artificially arrested between the inflamed vein and the centre of the circulation. In one instance a pad was placed over the upper extremity of the basilic vein, and retained in its position by a bandage. In two cases a needle was passed under a healthy and unaffected portion of the vein, and pressure was made by means of a figure-of-8 ligature; and in one case the vein above the seat of the inflammation was divided subcutaneously, the two divided extremities being secured by acupressure. Of these different plans of effecting the same object, Mr. Lee preferred decidedly the latter. In any future similar case it was that to which he should have recourse. By the operation of subcutaneous section a permanent union was effected, because that union took place between the opposed portions of cellular tissue on the outside of the vessel. Such a union was vascular, and, therefore, not liable to be broken down. By it no suppuration need be excited, and the needles used for the purpose of acupressure might be removed at the expiration of two, three, or four days, when the union would be complete. Union could not be insured within the same period by the pressure of a needle placed under the vein. If the needle be removed at that time, the current of blood would be liable to be re-established through the vein; if it be left, suppuration might be excited on the outside of the vessel; this might lead to the coagulation of the blood both above and below the part where the vessel was compressed, and the coagula thus formed might undergo the very changes which produced the serious symptoms for which the operation was undertaken. In one of the recorded cases this appeared in some measure actually to have happened, for although the current of blood through the vein

[1] Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, p. 29.

was arrested, yet suppuration took place both above and below the needle last introduced. In another case, on the contrary, where the vein was divided, no trace of inflammation extended beyond the divided part. In both these cases the products of the diseased actions were expelled from the interior of the veins by the process of suppuration; but had the flow of blood through the vessels been allowed to continue, some of these same morbid products would have been carried in the course of the circulation, and would have produced their effects in other and distant organs.

In reply to some criticisms, Mr. Lee remarked that his paper was upon the surgical treatment of acute inflammation of the veins after that disease had already been produced. He had purposely abstained on the present occasion from considering the best mode of operating for varicose veins, or from dwelling on the pathology of phlebitis. Those subjects had been fully discussed on former occasions, and some of the conclusions arrived at were recorded in the *Transactions* of this Society. As, however, the two subjects mentioned had been introduced to the notice of the Society, he might be allowed to say that in the operation for varicose veins it was, in his opinion, a dangerous practice to lay bare the coats of the vein. It was an operation that had been adopted by some of the older surgeons, and had often led to dangerous and even fatal consequences. The question which Mr. Savory had been good enough to ask—namely, whether the lining membrane of veins was liable to ordinary inflammation, and whether lymph could be thrown out upon its surface, was one of primary importance with regard to the pathology of this disease. All recognized the results of inflammation of a vein. After it had existed some time the coats of the vein became thickened; they could be felt as a hard unyielding cord below the skin; and if removed from the body and cut transversely, they would remain open like the coats of an artery; at the same time the cavity of the vein was filled with coagula, or with the fibrin of the blood more or less decolorized. Now, the great question at issue was, Does the inflammation of the vein produce this coagulation of the blood? or does the coagulation of the blood produce the inflammation of the vein? Is the lining membrane of the veins subject to spontaneous inflammation like the serous membranes of the body, and does it, like them, when inflamed, secrete lymph? Now he (Mr. Lee), ever since he had given his attention to this subject, had held that the lining membrane of veins was not at all analogous in its pathological relations to the serous membranes. Being non-vascular, it was not, like them, liable to attacks of spontaneous inflammation, and especially it was not capable, like them, of secreting coagulable lymph. When a serous membrane was inflamed, the lymph secreted united with the lymph on the opposed surface, and the cavity was closed where such a union took place. If the veins were liable to such mode of action, the circulation in our bodies would be constantly and permanently obstructed. But Nature had wisely ordained otherwise. The lining membrane of the veins, even under great irritation, would not secrete lymph; and the obstruction in veins was derived entirely from the materials of the blood. These observations applied to the disease in its earlier stages. During the later stages, when the parts had become altered by long-continued diseased action, the lining membrane of the veins might secrete lymph or pus like other parts. It was so with regard to the cartilages of joints, which might be taken as a rough illustration of the present subject; naturally they contained no vessels, and they could not secrete lymph; but after having undergone changes produced by long-continued disease, they might become permeated by vessels, and then they would secrete lymph and pus like other inflamed parts. In the early stage of the disease, he (Mr. Lee) had never seen a case in which lymph was effused on the lining membrane of a vein, and he held that in all cases of acute phlebitis the severe symptoms depended upon some morbid matter which had entered the cavity of the vein. If a portion of a vein were isolated from the rest of the circulation, and closed at two points by acupressure, the part of the vessel thus isolated might be cut or irritated in any way, and no symptoms of general irritation would be induced; whereas it was well known, from the writings of Sir B. Brodie and some of the older surgeons, what serious and fatal consequences would occasionally follow operations on the veins when such a precaution was not taken. When Ambrose Paré suggested the ligature of divided

arteries as a safe and comparatively painless mode of preventing hemorrhage, it was long before his doctrine was generally received; and it will not be, therefore, surprising if a considerable interval should elapse before the simple mode of preventing hemorrhage on the one hand or absorption on the other, from divided veins by acupressure, comes into general practice. But he (Mr. Lee) could say now, from a very considerable experience in operating upon varicose veins, that it was a plan perfectly effective and free from danger. When properly performed, it not only prevented any symptoms of general irritation from the usual operation of varicose veins, but when from any accidental circumstance inflammation of a vein had arisen, it would (as had been proved by the cases now read to the Society) prevent the extension of the inflammation along the inflamed vessel. This it did, of course, by preventing the transmission of the irritating contents of the vessels, upon which alone he (Mr. Lee) believed the symptoms to depend. With regard to the cases related being instances of genuine acute phlebitis, such as, without some preventive treatment, generally led to a fatal termination, he had only to appeal to the symptoms observed. When a severe rigor occurred in these cases, followed by a profuse perspiration, and the pulse continued from 120 to 140, he need not say that the gravest consequences were to be apprehended.

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30. *Resection of the Ankle-Joint where the Bones are crushed.*—During the late Schleswig-Holstein campaign, Professor Von Langenbeck, who acted as Surgeon-General to the Prussian army, made, amongst many other similar operations, five times the resection of the ankle-joint in cases where the bones were crushed to such an extent that many surgeons would have decided upon amputation of the leg. Von Langenbeck is of opinion that amputation may in many cases be dispensed with not only where the ankle-joint has been opened by a gunshot wound, but also where the bones constituting the tibio-tarsal articulation have been considerably injured. Where projectiles have passed transversely through the malleoli and the talus, a complete recovery may ensue without anything being done but incising the joint for the purpose of providing an exit to the pus, and extracting bone splinters which may be present and are accessible to the surgeon.

It is a curious fact that the resection of the ankle-joint has many times been performed, since the end of the last century, for complicated fractures and dislocations, and for caries, amongst others by Messrs. Gooch, Moreau, Cooper, Jäger, and Textor, but that in none of the numerous wars which have been waged since that time has the same operation been made in gunshot injuries of the ankle-joint. M. Velpeau, it is true, states in his treatise on operative medicine that a Mr. Read had, in a case of gunshot wound of that joint, sawn off the lower ends of the tibia and fibula, and that a useful foot had been the result. Most authors quote this case, after Velpeau, as one of resection; but on close analysis it appears that the operation, which was performed after the battle of Fontenoi, in 1745, consisted merely of the extraction of fragments of bone from the crushed ankle-joint, and not of resection, which latter was not known before 1768. Nevertheless, the case in question, which is fully mentioned in Faure's prize essay on amputation (1759), is one of great interest, and shows how much may be done by conservative surgery.

Neither in the Crimean nor in the last Italian war has the resection of the ankle-joint been performed. Recent authors on military surgery, such as Demme and Legouest, reject the operation altogether as unsuitable. Now, Professor Von Langenbeck had, since 1850, four times performed it in private practice. In all these cases there had been long-continued suppuration after injuries. In two of them there had been complicated dislocation of the foot; in the third, dislocation of the foot, with fracture of both malleoli; in the fourth, that of an old Russian officer, the ankle-joint had been crushed in the battle at the Alma by a Minié ball. In the first two cases a piece of the tibia, three inches long, was resected; in the third, both malleoli and the surface of the talus; in the fourth, a piece of the tibia, four inches long, and the largest portion of the talus. In all these cases the periosteum was completely preserved, and the cure resulted without shortening, abundant osseous tissue being formed. In the second and

fourth cases there was anchylosis; but in the first and third a movable ankle-joint resulted. These two latter patients are now frequently seen by the Professor, and they are able to walk to any distance without inconvenience.

In consequence of the good results thus obtained, the Professor determined on setting out for the Schleswig-Holstein campaign to perform the operation whenever suitable cases might offer. He did it five times between May and August, 1864. All were late operations. One patient died of hospital gangrene; all the others recovered. Two were Prussian soldiers, three Danish prisoners captured in the island of Alsen. In the first case a rifle bullet went into the malleolus internus and came out of the malleolus externus of the left foot. Both malleoli and the upper surface of the talus were resected, the piece taken out being two and a half inches long. The joint is now anchylosed, but the patient is able to walk for a quarter of an hour at a time without inconvenience. There is no shortening, and the formation of new osseous tissue has been so abundant that the circumference of the leg operated upon is much larger than that of the other. In the second case the malleoli were splintered into seventeen pieces to the length of three inches. The resection was done, but the patient died ten days afterwards of nosocomial gangrene. In the third case the lower end of the left tibia and fibula were fractured by a bullet, which went into the crista tibiæ, and came out at the back close to the tendo-Achilles. The foot was considerably dislocated. A piece of the tibia, four inches long, and broken into fourteen fragments, was removed, and the cure was quite satisfactory. In the fourth case the bullet went into the joint just below the malleolus externus, and went out by the middle of the internal malleolus. A piece three and a half inches long, being the lower end of the tibia and the upper surface of the talus, was removed. The cure was complete about two months afterwards. In the fifth case there was total crushing of the ankle-joint, with considerable dislocation of the foot. Both malleoli and the whole of the talus were removed, and the cure was complete in about two months afterwards. The last three patients, however, when last heard of, had not yet commenced walking.

All these operations were done altogether sub-periostally; the periosteum, which was very much thickened, being torn off the bone in connection with the fibrous envelop of the malleoli and the ligaments. The interosseous membrane was always most carefully spared, and this is a circumstance upon which much stress should be laid, because this membrane, being closely allied to the periosteum in texture, according to Von Langenbeck's observations, probably always becomes ossified, is completely amalgamated with the newly-formed bone, and serves to increase the bulk of osseous tissue. The Professor has, in his operation, never laid bare nor injured any tendons, vessels, or nerves. He has sawn through the bones with his stitch-saw by comparatively small incisions. If only one bone was crushed, this one only was removed, and the other bones left undisturbed, even if they were transversely fractured. The cutaneous incision was always made on the inner surface of the tibia or the outer surface of the fibula, but never before or behind these bones. If both malleoli had to be removed, a perpendicular incision was made on the middle of each bone. The operation was, as a rule, not connected with much difficulty, only in the fifth case it proved troublesome, as the whole of the talus had to be removed. The wound was always united by sutures, only a small opening being left for the escape of pus; after that the plaster of Paris splint was put on, and the wounded part rendered accessible by cutting a hole into the bandage. A day or two afterwards the splint was soaked with a solution of resin in ether, whereby it was rendered water-proof, and then local baths were employed. In most cases the first splint was left on unchanged for three or four weeks.—*Med. Times and Gaz.*, March 25, 1865.

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31. *Amputation of the Leg by a Long Rectangular Flap from the Calf.*—Mr. HENRY LEE, in a paper read before the Royal Medical and Chirurgical Society (May 23, 1865), called attention to Mr. Hey's mode of operating by means of a long flap from the back of the leg, and to Mr. Teale's plan by a long rectangular flap from the front. The advantages of both these plans might be combined by making a rectangular flap from the back instead of from the front

of the leg; a thick soft cushion might thus be provided for the ends of the bones, and no large nerve need be left in the flap. The operation described was performed according to Mr. Teale's plan as far as the external incisions were concerned, but the long flap was made from the back instead of from the front of the limb. Two parallel incisions were made along the sides of the leg; these were met by a third transverse incision behind, which joined the lower extremities of the first two. These incisions, which formed the three sides of a square, extended through the skin and cellular tissue only. A fourth incision was made transversely through the skin in front of the leg, so as to form a flap in this situation, one-fourth only of the length of the posterior flap. When the skin had somewhat retracted by its natural elasticity, an incision was made through the parts situated in front of the bones, which were reflected upward to a level with the upper extremities of the first longitudinal incisions. The deeper structures at the back of the leg were then freely divided in the situation of the lower transverse incision. The conjoined gastrocnemius and soleus muscles were separated from the subjacent parts, and reflected as high as the anterior flap. This part of the operation was performed with the greatest facility, on account of the loose attachments of these muscles, especially at the lower parts of the leg. The deeper layer of muscles, together with the large vessels and nerves, were divided as high as the incisions would permit, and the bones sawn through in the usual way. The flaps were then adjusted in the manner recommended by Mr. Teale. The long flap thus formed was much thicker than when taken from the front of the leg. It was consequently less liable to slough. It afforded a much more efficient protection to the ends of the bones, and a thicker and softer pad upon which to rest a part of the weight of the body when an artificial limb was applied. Three cases were detailed in which this mode of operating had been adopted, and drawings given of the stumps after they had healed. Two other cases were mentioned. In one of these, which was performed after great loss of blood from ulceration of the anterior tibial artery, in a case of very severe compound fracture, the patient died. In the other case the patient made a rapid and good recovery. These were, the author believed, all the instances in which this particular operation had been performed.

Mr. Lee said it was well known that the object of surgeons generally was to prevent pressure on the extremity of a stump by resting the weight on the limb above the cicatrix. So engrafted with this idea are the minds of the mechanicians also that he had the greatest difficulty in persuading them to make an artificial limb which would press on the end of the stump. But an essential part of Teale's operation was that with a stump thus formed the patient should rest on it. This was the great object of Mr. Teale's operation. The cases he (Mr. Lee) had just read were the only cases in which the operation described in the paper had been performed. One of the patients operated on, and whose case was related in the paper, had just written to the nurse, challenging her to walk three miles with her. In this case particular care had been taken to see that the patient did bear on the end of the stump, and that it was not more sensitive than any other part. Mr. Lee then showed a preparation of a stump, and drawings illustrating the points of his paper.—*Med. Times and Gaz.*, June 3, 1865.

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32. *Warty Ulcer of the Leg of Thirty Years' Duration; Amputation; Recovery.*—Dr. M. H. Stapleton exhibited to the Surgical Society of Ireland the leg of a patient, afflicted for the last thirty years with an ulcer which well exhibited all the characteristics of the warty ulcer of Marjolin, and gave the following history of the case: Thadeus Dooley, æt. 50, was admitted into the Mater Misericordiæ Hospital on the 1st of December, 1864. He states that when about 16 or 17 years of age, he was attacked with a great pain in his leg; that the pain was on the inside of it, and that after a fortnight the leg burst, and after a little time there came a sore which ate a hole in it which bared the sinews; that sometimes there used to be a scab on it, but that it never healed; that after some years a little nob came on the bone; that it then became a sore and ate into the bone; that he has had several *doctors* (not real ones), and that each had his way with him, but that he got no better; that some time ago a lot of proud flesh grew out of it, and that he went to a real doctor, who, he

said, burnt it with an aqua fortis, which took away the proud flesh, but did no other good, as it neither healed it nor removed the torture, and that he was not able to use his leg for the last four years before applying for admission. He said he came to town determined to part with his leg, as he could no longer endure his torture.

The ulcer was situated on the lower third of the leg, over the inner side of the tibia and neighbouring soft parts. The surface was irregular, and studded with several hard warty prominences. A probe could be passed into the bone, which was black and carious, and lay at the bottom of the ulcer.

The integuments for some short distance round the ulcer were thickened, the edges were shining but not everted. The discharge was thin, sanious, and very fetid. His countenance was pale, careworn, and expressive of much suffering. His pulse was small, weak, and rather quick. His nights were almost sleepless, and he was most anxious to have the leg off. Having determined on its removal, the next question was, at what part of the limb it should be removed. I was at first determined to take it off above the knee, and my reason for so doing was the danger of the tibia being diseased, or, the soft parts, from their proximity, taking on the diseased action. The arguments for operation below the knee were—the greater danger to life if removed above the knee; the patient's age; the healthy appearance of the parts below the knee; the apparent normal feel of the muscles; and that in this form of disease the bone becomes indurated with obliteration of its medullary canal.

Yielding to the supposed advantages, I, on the 21st of January, 1865, amputated below the knee by the usual flap operation. I then found the tibia in a state of disease, being extremely thin and brittle, and the medullary canal filled with a fluid resembling oil, which flowed freely. The posterior flap, or rather that part of it formed by the soleus muscle, was converted into a white, firm, elastic substance. A substance of like description surrounded the arteries, and it was found impossible to properly secure them. The veins were canalized, from being surrounded by a like substance. Finding the parts in so diseased a condition, I immediately performed the circular operation above the knee. The femur was found to be extremely dense in its structure, and cut like ivory. The vessels were easily secured, and, I am happy to say, so far all is going on well, two-thirds of the wound having united by the first intention. Any one looking at this ulcer will at once perceive its warty nature. The patient denies that there was ever a scar or cicatrix on his leg. Mr. Cæsar Hawkins states that this form of ulcer is only developed in cicatrices, yet in his second paper on the subject, published in 1841, he gives a case where he mentions "that there was some doubt whether the disease might not have originated in the bone, and ulcerated outwards into an old cicatrix, the disease then presenting the usual warty growth and fungous appearance of cancer of cicatrices; but if it were so, it equally shows that cancer of a cicatrix is possessed of certain characters in whatever way it begins, and that both the skin and the bone may be extensively destroyed by ulceration."

Here, then, we have a supposition of a cicatrix to carry out a theory. In a former paper, which I had the honour of reading before this Society, I ventured to express an opinion, that I did not believe the true pathology of the warty ulcer was as yet made out, and I still maintain the same opinion, as I have seen superficial ulcers with a warty appearance heal, and I have seen scirrhus when ulcerated take on a warty appearance, which again would be destroyed by phagedenic ulceration, and would reappear in scirrhus when the latter ceased.

Mr. Cæsar Hawkins believes this disease to be malignant, but malignant in the slightest degree. Prof. Smith, in his very able paper on the "Warty Ulcer of Marjolin," is of the same opinion, and he gives a case of secondary contamination occurring eight months after the removal of the morbid structure, and which proved rapidly fatal.

I also adhere to my former opinion, that the warty or fibrous ulcer is cancroid or cancerous. However, all are agreed upon one point—viz., that it should be removed. The removal may be effected in either of two ways—by the knife or caustic; and if caustic be used, I believe chloride of zinc to be the best for the

purpose. As to the advantages or disadvantages of either method, I will not at present enter.

To those desirous of further information on this subject, I would refer them to Marjolin's paper on "Ulcer," in the *French Dictionary of Medical Science;* to Mr. Cæsar Hawkin's paper; to that of Prof. Smith; and to the communication I had the honour to lay before this Society on a former occasion.

Mr. Stapleton proceeded to say, that any one who looked at the bone which was on the table would see, that instead of being condensed, it had undergone what he would call a fatty degeneration, and on looking at the upper portion of the tibia they would see it was filled with a fluid resembling oil. The muscles were converted into a hard fibrous substance, and such was the extreme density and consolidated texture of the femur that the particles separated like ivory dust under the saw. He was happy to say the man was going on remarkably well. Two-thirds of the wound were healed. No bad symptoms had set in, and the patient expressed himself as being greatly relieved. His age was 50. As he had already observed, the specimen, though so recent, did not show the warty structure so conspicuously as before amputation.—*The Medical Press*, April 12, 1865.

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33. *Prevention of Suppuration after Operations on Tumours.*—At the meeting of the Academy of Sciences, on November 28, M. Velpeau communicated a note from M. Pétrequin, in which that surgeon advocated the application of tincture of iodine as a means of preventing suppuration after the removal of tumours; especially in situations such as the face and neck, where it is desirable to prevent the formation of cicatrices. Hitherto, M. Pétrequin observed, iodine has been applied with the view of modifying the suppurative process; but M. Pétrequin's object has been to prevent it altogether. He has, like M. Velpeau, many times observed that, in hydrocele, for instance, suppuration was less likely to follow the injection of tincture of iodine than of wine. He has never seen suppuration follow the injection of iodine into the parenchyma of organs, into glands, into the thyroid body, or into cavities; but, on the contrary, the formation of pus appears always to have been prevented.—*Gaz. Méd. de Paris*, Dec. 10, 1864.

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34. *New Form of Fixed Bandage for Fractures.*—Mr. Campbell De Morgan extols (*Med. Times and Gaz.*, May 20, 1865) a simple mode of applying a firm apparatus, described by Dr. L. Hamon in the early numbers of the *Gazette Médicale de Paris* for the present year. Mr. De Morgan and his colleagues at the Middlesex Hospital have used it frequently.

"The material with which the bandage is stiffened is glue, and it should be prepared as follows: The best French glue should be used. It should be broken up and soaked in a little cold water for some hours, and then melted in the usual way in a glue pot, as little water being used as possible. It is not necessary to soak the glue in cold water, but if this is not done it will require the longer heating. When it is to be used, about a fifth part of its bulk of alcohol must be added—methylated spirit answers quite well. At first this converts a great part of the melted glue into a whitish coagulum, but by a little stirring it all liquefies, and is then fit for use. The alcohol is added to induce the rapid drying of the glue—which would otherwise remain soft for many hours, but when mixed with the spirit begins to get firm on the surface very soon after it is applied, and in a short time becomes tolerably firm throughout. It should be applied with a moderate sized flat hogs' bristle brush. Supposing that a simple fracture of the leg is to be treated, these are the steps to be taken:—

"The foot should be neatly and firmly bandaged from the toes to the ankle. Two or three streaks of glue along the sides and front will secure the bandage, so that it need not be again disturbed. The leg from the ankle to the knee should then be covered with a very thin layer of cotton wool—not the medicated wool, as it is called, but such as is procured in sheets for lining dresses. Of this a layer not more than the eighth of an inch in thickness can be easily stripped off, and smoothly applied to the leg. A cotton bandage should then be rolled very smoothly and with tolerable firmness up the leg from the ankle to the knee, and well painted over with the glue. Another bandage should then be placed

over the first, and the gluing process repeated. A third may then be applied and glued, and then a bandage should be put on over all, and the leg placed in position, and retained, if necessary, by sand bags or junks. Of course, if the surgeon please, he may apply strips of bandage, or of any linen or cotton material he may find at hand, instead of repeating the rolling process. The glue should be laid on freely, and brushed a little into the bandage. In some cases two layers of the glued bandage will be found sufficient. In others it may be desirable to give greater support; but this can always be done as an after-process. The leg should be left at rest for from twelve to twenty-four hours. The glued bandage must then be cut through its whole length. This may be done with the ordinary scissors used for the starched bandage, or a director may be insinuated beneath the bandage and cut upon with a sharp knife. If too long a time elapses before the bandage is cut through, it becomes so hard that great difficulty may be found in cutting it at all. When the bandage is thus slit up, so great is its elasticity that it may have its edges separated sufficiently to allow it to be easily slipped off the leg; and when left to itself it will resume its original shape, and this elasticity it will retain for as long as it is used. A strip not more than a quarter of an inch wide, and running the whole length of the bandage, should now be cut off from one edge, and holes punched out parallel to the edges on either side, and about half an inch from them; into these 'œillets' are to be inserted, such as are commonly used in laced bandages or boots.

"The punching and insertion of the œillets are rapidly done with the common instruments used for the purpose, which, with the œillets, can be had at any toolmaker's.

"The bandage is now complete. If it is thought desirable to strengthen it generally, or in any particular part, this may be done by gluing on fresh strips of linen. Its appearance may be improved by gluing on an edging of tape round the top and bottom, and along the sides of the slit. It is reapplied to the leg, and laced up as firmly as may be thought necessary. The lace, if it is not furnished with a tag, is best introduced on an eyed probe, and it should always be passed from without inwards. If the tag is introduced from within it always gets entangled in the cotton wool, and the process of lacing is extremely troublesome.

"Thus a case is formed which is completely moulded in the form of the limb, is very elastic, very firm, and very durable, and which can be accommodated with perfect ease to all the varying states of swelling of the limb.

"In situations were the roller cannot be conveniently carried round the part, the splint can be just as well formed by laying strips of linen in any direction and gluing them. The cotton wool of course adheres to the first layer of the bandage, and comes off when it is removed. It is applied in the first instance in great measure to keep the glue from contact with the skin.

"The great advantage of this splint is its union of firmness with elasticity. These qualities it retains undiminished for a great length of time. I have found no alteration in these respects during the many weeks that some patients have worn it; a patient now in the hospital has worn it for six weeks, and I find no change in either its firmness or elasticity. At any time it could, if required, be strengthened by a few strips of linen being glued on it.

"I have described it as applied to fracture of the leg, but it can be used in any situation where support is required. Thus I have used it in Pott's fracture, inclosing not only the leg, but the ankle and foot, and have found that it could be slipped on and off with the greatest ease. I have used it in fractured patella, after sprains to the knee and ankle-joints, in diseased knee-joint, and in case of diseased hip-joint encircling the pelvis and upper part of the thigh.

"Altogether this 'bandage gelatino alcoolisé lacé' appears to me to be one of the best as well as the most easily applied, and most convenient in its after use, of any of the modifications of Seutin's bandage which have as yet been tried, and it is well worth the notice of surgeons. The advantage which it possesses over others is in its elasticity, which permits of its being widely opened when slit up, without cracking or losing its form. Hence it can be applied as a laced bandage, and may be worn for weeks together, while the patient is moving about, without the trouble of readjustment; while it can be accommodated to any

change in the state of the limb, through increase of swelling or its diminution, by simply letting out the lace, or taking it in, without even removing the bandage. It is, moreover, very light, and yet strong enough for any purpose to which a splint can be applicable."

35. *Modification of Fixed Apparatus for Fractures.*—Prof. Jolliffe Tufnell describes (*Dublin Quarterly Journ. of Med. Sci.*, Feb. 1865) a modification of the fixed apparatus which he has used both in hospital and private practice with great satisfaction.

"The material required," he says, "for forming these splints is very generally available, consisting only of lint or old linen for the inner lining; strips of the same, torn three inches in width, and long enough to reach from the head of the tibia to the sole of the foot. To make the splint itself: The white of eight eggs and half a pound of flour for the fixing substance. These are all that are required; each and every one of which is to be procured in almost the poorest home—and as such, this splint is readily available to the surgeon in country practice.

"The main feature of difference between this mode of setting fractures and every other kind of fixed apparatus, is the construction of the splint in two halves, and the applying of the bandage, which is to form the same lengthwise, instead of circularly, thus avoiding all possible sources of constriction of the limb.

"Supposing, then, that the fracture has occurred in a city, or wherever else the most desirable materials are to be procured, the surgeon sends for the following, and places them beside him before interfering with the patient, further than to strip him of his clothes and lay him upon a properly prepared bed, upon the side opposite to the fractured limb—the leg itself being supported easily on a pillow—and the fracture, as far as possible, reduced. The articles required are —a table for spreading the bandages upon, a wash-hand and small sharp-edged basin, eight eggs, and half a pound of flour, as before stated; a large iron or silver spoon, a large knife, three calico roller bandages, half a yard of Taylor's lint, and some hot water. The lint is first thrown upon the limb, from the knee to the sole of the foot, and cut roughly into the outline of the limb, of a size sufficient to tuck under the sole at the bottom, and from side to side of the leg.

"This lint is placed in the large basin, and hot water poured upon it, so as to saturate it completely, and whilst dripping, and without being wrung, it is lifted out and put upon the outer side of the limb of the patient who is lying with the leg bent, and exactly in the same position recommended by Pott, with this difference that the limb is on the inner instead of its outer side, by this measure insuring subsequent inversion instead of eversion of the foot. Extension and counter-extension are now made by the hands of two assistants, and the fracture set by the surgeon, who models the wet lint on to the limb with his hands, so that it is as closely applied as a stocking would be; any starting or spasm of the muscles is prevented by the assistants just laying their hands steadily upon the limb. The surgeon now breaks the eggs upon the sharp edge of the small basin, drops the yelks into it, and the albumen into the other, having first thrown out the hot water which was previously in it for wetting the lint; he then takes sufficient flour, according to the size of the eggs, and with the spoon beats it and the albumen into a homogeneous mass of the consistence of pancake. He next measures with the end of a roller the length of the limb, from the knee to the centre of the sole, and placing the forefinger of his left hand, pointing upwards, and the forefinger of an assistant opposite to him at the required distance, he winds the whole of the three roller bandages, one after the other, around the fingers, and then with a scissors divides them at either end; thus in a few moments obtaining the strips necessary for the splint, all of exactly the same and the proper length. Each of these tails is now spread thickly with the egg and flour upon one side, and as spread, folded double, with the plastered surfaces opposed and laid aside. The object of this is to keep them moist, and in hot weather from drying; as soon as they are all done the surgeon commences, and having them handed to him one by one, he lays them on the limb, moulding them to it, layer after layer, from the innermost portion of the tibia within to

the farthest point of the calf of the leg that can be reached behind, covering accurately the instep, the toes, sole and heel, and not leaving a wrinkle or crease. The large knife which has previously been employed for spreading the bandages with egg and flour, is now employed as a spatula, and taking a few of the tails of bandages which have been left unspread, these are passed beneath the limb, and one after the other brought around it (as shown by the dotted lines), so as to confine the wet tails to the leg, and not allow them to be raised from off it as they otherwise would be by the expansion of the heated air which becomes rarefied within.

"The limb is now *left uncovered* till next day; if covered, the splint will not dry, but retains a kind of pasty condition, whilst if exposed to the air for twenty-four hours it will be as firm and as light as cardboard on the limb. Upon the succeeding day the patient turns over upon his opposite hip, and the same proceeding is repeated exactly as before, taking care that the lint lining goes well over the limb, so as to be in advance everywhere of the plastered strips, which if allowed to come in contact with the other portion of the splint would intimately adhere to it, and cause difficulty in the separation of the halves; this too is allowed to dry. Upon the succeeding morning the two half splints, or only the second half, as the surgeon may think fit, are removed, the edges trimmed neatly with scissors, the second half overlapping the other by at least half an inch, insuring correctness, whilst all pinching of the integument is prevented; when the roller bandage is subsequently put on, the two portions of the splint, in fact, should glide, as it were, the one over the other. Nothing more remains to be done; a couple of fillets to confine them to the limb, or a lightly applied roller bandage are sufficient, and the patient may now lie in bed with his leg straight or bent, as he wishes, raised up upon a pillow, or slung, whichever way he fancies or feels it easiest; and after a few days may get up, supporting the extremity by a sling round his neck.

"Subsequently, when the patients come to exercise and move about, and the size of the limb to decrease, the splints may be brushed over inside with hot paste (as also around the edges), and a piece of chamois leather, previously cut to the size and shape, moulded in to form a softer and additional lining.

"These splints are very light, weighing, when dry, but a few ounces, yet from their extreme accuracy in fitting the limb, and evenness of pressure, most surprisingly strong.

"The same material I also employ in the immediate treatment of fracture of the fibula, and, at a later period, in fracture of the thigh, used in the circular form; put on, however, in tails, imbricated one over the other, and not as a roller bandage. Thus applied it is, of course, necessary to slit it up prior to removal, and for this purpose I employ a blunt gorget with the handle reversed, using it as an ordinary director, and cutting down upon the grooved steel with any sharp pointed knife. Seutin's pliers and all other kinds of scissors and dividers I have tried and found objectionable in use, causing more or less annoyance and pain to the patient from the pressure exercised upon the soft parts in making a division of the harder external case, whereas the gorget slips along upon the skin, whilst its broad, round, and polished surface is cut down upon without the slightest motion or pressure, and is not noticed hardly by the individual."

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36. *Rare Variety of Inguinal Hernia* (*Cooper's Encysted Hernia of the Tunica Vaginalis*).—As the result of an elaborate investigation into the nature of this form of hernia, M. BOURQUET arrives at the following conclusions: 1. There is a variety of hernia characterized by the presence, within the tunica vaginalis of the testis, of an isolated and independent hernial sac. 2. This sac, entirely distinct from the tunica vaginalis, is formed by a diverticulum of the peritoneum, which becoming engaged within the superior orifice of the inguinal canal, afterwards projects within the cavity of the serous membrane of the testis. 3. The tunica vaginalis then presents a more or less considerable enlargement, and may become the seat of an accumulation of liquid, which coexists with the hernia. 4. The designation, "hernia with a double sac," or "hernia with intra-vaginal sac," would seem to be more appropriate, as giving a more exact idea of the nature of the affection than that of "encysted hernia of the tunica vagi-

nalis," bestowed upon it by Sir Astley Cooper. 5. The nature of this hernia is accidental, not congenital, and its mode of production, its symptomatology, its progress, and its anatomical characters, place it in the same category with ordinary inguinal hernia. 6. Strangulation may not only take place at the neck of the sac and the aponeurotic rings, but also much lower down, within the interior of the tunica vaginalis itself, through a laceration of that membrane. 7. The increased extent of the tunica vaginalis, and the presence of liquid in its interior, may lead the surgeon into error at the time of the operation for the strangulated hernia, causing the sac to be mistaken for the intestine, and leading to the belief that the sac has been opened, when the tunica vaginalis only has been entered. 8. In order to avoid this error, of which examples are recorded in the annals of surgery, the sac should be drawn out and cautiously opened either with the nails or by the bistoury.—*Brit. and For. Medico-Chir. Review*, April, 1865, from *Gaz. Hebdom.*, Nos. 44–50, 1864.

37. *Hydrocele of the Canal of Nuck.*—Dr. Albert Walsh brought under the notice of the Surgical Society of Ireland (March 24, 1865) the following case of this:—

Mary M. Dermot, an emaciated woman, who stated her age to be 46, was admitted into the Adelaide Hospital on the 18th of last January. She was then suffering under scirrhus of the right breast of eighteen months' standing, and was in almost the last stage of cancerous cachexia. The right arm was markedly œdematous, and shortly after her admission, the right leg became œdematous also. On exposing her groin for the purpose of showing the enlarged glands to the class, I observed a tumour occupying the position of the external abdominal ring. The patient's attention having been called to it, she at once stated, that she had never noticed it until the week before, when she felt it "among the other kernels." It was oval in shape, about the size of a small egg, and communicated a distinct sense of fluctuation. It was not influenced in any way by pressure or manipulation. It received no impulse upon coughing or straining, and was perfectly translucent when viewed by transmitted light. Under these circumstances I expressed my opinion that it was probably a hydrocele of the round ligament, and on the 4th of February proceeded to tap it with a fine trocar. I drew off about two ounces of a clear albuminous fluid resembling that contained in a hydrocele of the tunica vaginilis, when the tumour collapsed and entirely disappeared. The external puncture was then sealed up with collodion. The next day the patient complained of some pain in the part, the sac commenced to refill, and had almost regained its former size when she died, on the 11th of February.

I made a careful post-mortem examination forty-eight hours after death, when the œdema of the right extremities was fully accounted for, by the enlarged interthoracic and iliac glands. On raising a triangular flap of skin and dissecting down upon the tumour, I found it to be of a light-blue colour, completely filling up the external abdominal ring and extending along the inguinal canal, both pillars of the ring being clearly defined and distinctly separable from it by a probe. Below, the sac ended in a bulging extremity fully a quarter of an inch short of the termination of the posterior wall of the canal, and was attached throughout to the round ligament, which could be traced by itself some distance further down. On slitting up the ring the sac was seen to extend nearly half-way up the canal, and its entire dependence on the round ligament became apparent, traction on the ligament from within producing corresponding movement in the sac. The specimen, in fact, answered in every respect to the description given by Regnoli[1] of his third variety of hydrocele in woman—namely, "hydrocele of the canal of Nuck without communication with the peritoneum. On the extreme rarity of this form of hydrocele it is unnecessary to insist. So much is it the case, that not only do the ordinary text-books of Druitt, Erichsen, and Cooper completely ignore the subject, but even Chelius and Rokitansky overlook it, while Paget merely informs his readers in a footnote of two lines that there *is* such a thing as hydrocele of the round ligament.

[1] Arch. Gén. de Méd., second series, vol. v. p. 114.

The disease, however, has been recognized by so early an observer as Aspasius; and Paré, Desault, and Lallemand in France, and Palletta and Sacchi in Italy, have each recorded a case of it. But it is to Regnoli that we owe almost all our information in the matter, and his researches have enabled him to arrange hydrocele in the female under five heads: first, œdema of the round ligament; second, hydrocele of the canal of Nuck communicating with the peritoneum; third, hydrocele of the canal of Nuck without communicating with the peritoneum; fourth, encysted hydrocele; and fifth, accumulation of serum in the sac of an old hernia, the neck of which has become obliterated. In spite of this, Velpeau "is convinced that the question needs further investigation," and has his "reasons for believing that several, if not all the tumours hitherto described as cases of hydrocele in women, consisted of nothing more than cysts of the labia majora or mons veneris." In defence of this position he urges, that the round ligament terminates on the posterior wall of the inguinal canal, and that in the cases described by the French surgeons the cyst lay between the ring and the labium. He alludes also to four cases which came under his own notice, in all of which he satisfied himself that the tumours were "accidental cysts, and not effusions into a primary peritoneal sac." In none of them, he says, had the tumour any relation or continuous connection either with the peritoneum or round ligament. An instance like the present, therefore, could never have fallen under the observation of Velpeau, for this perfectly comes up to his standard of the attributes which should be possessed by a genuine hydrocele. Here the sac is situated on the continuity of the round ligament, rather within than without the ring, and is, in addition, evidently connected with the peritoneum. In fact, his cases appear to have been just what he supposed them to be—that is, cysts of the mons veneris and labia majora. But Velpeau must not be misunderstood to deny the possibility of the existence of the hydrocele in question. He merely mentions that he has never seen an instance of a hydrocele situated above the end of the round ligament, and shows that, as nearly all the cases described as such were published before he and Thompson demonstrated that the ligamentum teres does not descend into the labium, it is highly probable they were simply cysts of the labia likewise. The present specimen is also curious in another respect. In every case with which Velpeau is acquainted, the tumour was perfectly opaque when viewed by transmitted light, while in this instance the sac was even more translucent than the ordinary hydrocele in the male, probably owing to the comparative thinness of the walls of the sac and of the contained fluid. The accompanying drawing by Connoly gives a very good idea of the appearance and position of the tumour before puncture.

Dr. Walsh added that Dr. Fleming had pointed out to him the report of a case which came under his notice some years ago in the Richmond Hospital. It was that of a woman who applied at the hospital to have a truss fitted, as she was told she had hernia. He (Dr. Walsh) was of opinion that this came under the fifth class described by Regnoli—that it had been a sac of old hernia, the neck of which had become obliterated, and into which there had been serous effusion.—*Medical Press*, May 3, 1865.

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38. *Solvent Treatment of Urinary Calculi.*—Dr. ROBERTS communicated to the Royal Med. and Chir. Soc. (March 28) an experimental and clinical inquiry on this subject.

This paper was divided into two parts. The first part is devoted to experiments and observations relating to the solvent treatment of uric acid calculi by alkalizing the urine by internal medicines. The inquiry starts from two known data—namely: first, that uric acid is dissolved by solutions of the alkaline carbonates of a certain strength; and, secondly, that alkaline carbonates can be introduced into the urine, so as to render it alkaline, by the administration of certain salts by the mouth. The practicability of dissolving renal and vesical calculi, composed of uric acid, by alkalizing the urine, is inquired into under ten headings or sections as follows: Section 1. Comparison of solutions of carbonate of potash and carbonate of soda: in which it is shown that solutions of carbonate of potash are better solvents for uric acid than solutions of carbonate of soda. Section 2. Comparison of solutions of different

strength: in which it is shown that the greatest solvent power (for uric acid) lies in solutions containing from forty to sixty grains of carbonate to the imperial pint. Above this strength dissolution is soon prevented by the formation of a crust of biurate which invests the stone. Below this strength the solvent power gradually declines. Section 3. Comparison of the effects of varying volumes of solutions of constant strength.—It is shown that the quantity of the solution permitted to pass over the stone, between the limits necessarily imposed by the capacity of the kidneys to separate aqueous fluids, is of slight importance. A flow of three or six pints during twenty-four hours was found nearly as effective as a flow of eight or fifteen pints. Section 4. Absolute rate of dissolution of uric-acid calculi in solutions of the alkaline carbonates.—It is shown that solutions of carbonate of potash, of the maximum solvent power, when passed at the rate of from three to eight pints in the twenty-four hours over uric calculi, at the temperature of the body, dissolve from ten to twenty per cent. of the weight of the stone each day. Section 5. The most convenient way of alkalizing the urine, the degree of alkalescence which can be communicated to it, and the doses required to produce the desired effect.—The bicarbonate, acetate, and citrate of potash are found the most effective substances to alkalize the urine. Of the three the citrate is preferred. It is found that forty grains of citrate of potash dissolved in five ounces of water taken every two hours alkalizes the urine to a mean degree corresponding with the maximum solvent power of solutions of carbonate of potash. Section 7. The effect of alkalized urine or uric acid calculi.—The urine of a person taking full doses of citrate of potash, as recommended in Section 5, is passed over a uric acid calculus at blood heat. The stone (weighing 180 grains) loses weight at the rate of twelve grains and a half in the twenty-four hours. In the performance of experiments on this point it came out that if the urine became ammoniacal (from decomposition of urea) it ceased to dissolve the uric acid, and the stone became invested with a crust of precipitated phosphates. Whence the important deduction is drawn that ammoniacal decomposition of the urine in cases of vesical calculi puts an absolute bar to the effectiveness of the solvent treatment by alkaline carbonates. Section 7. Illustrations of the application of the solvent treatment in practice; first in renal calculi, secondly in vesical calculi.—Two cases of complete dissolution of uric acid calculi in the bladder are quoted from other authors. The author relates three cases which occurred in his own practice. In none of the latter did complete dissolution occur. One of the cases proved to be an example of mulberry calculus; another, an alternating calculus of uric acid and oxalate of lime. This second specimen offers peculiarities of surface which indicate with certainty that dissolution of the uric acid had taken place: these peculiarities are explained by the aid of drawings of the stone after extraction. The third case proved abortive apparently because the treatment was not carried on sufficiently long. In neither of the cases was the treatment carried out as effectively (as the later experience of the author showed) as it might have been. The principal instruction from the cases is, the proof they offered that alkalizing the urine does not cause the stone to be incrusted with a phosphatic deposit, so long as ammoniacal decomposition of the urine does not take place. Section 8. Discrimination of the cases in which the solvent treatment is and is not applicable.—The conclusions come to are: That the solvent treatment is inapplicable in all cases where the urine is ammoniacal. When the urine is acid (before treatment) the case is *primâ facia* suitable for the alkaline solvent treatment; but exceptions must be made of cases where it is known or strongly suspected that the stone is composed of oxalate of lime, also where the stone is large. In cases where the urine is acid, and there is no indication of the nature of the stone, it may be either uric acid or oxalate of lime, or an alternating calculus composed of these two substances. Such cases deserve a trial of the solvent treatment for a limited period of a month or six weeks. The cases which are especially suitable for the solvent treatment are those in which (the urine being preliminarily acid) it is known or strongly suspected that the stone is composed of uric acid, and has not yet reached any large size. Section 9. Directions for carrying out the solvent treatment effectually.—The urine must be kept continuously alkaline, and alkaline to a mean degree corresponding with

the maximum solvent powers of solutions of carbonate of potash. The treatment must be given up immediately if the urine become ammoniacal. Section 10. An examination of some of the objections which have been urged against the principles of the solvent treatment. The appendix to the first part contains some experiments showing that cystine is even more amenable to the alkaline solvent treatment than uric acid. The second part of the paper contains three sections. Section 1 contains experiments on the solvent treatment of uric acid calculi by injections into the bladder. Solutions of the following substances were tried in a manner to imitate injections into the living bladder: Bicarbonate and carbonate of potash, common phosphate of soda, basic phosphate of soda, borax, borax with liquor sodæ, potash soap, carbonate of lithia, liquor potassæ, and liquor sodæ. The results obtained demonstrated conclusively that their operation was so slow that no practical advantage could be obtained from their use. Section 2 records some experiments on the effects of a solution of carbonate of potash and dilute uric acid on oxalate of lime calculi: neither solvent promised any useful result. Section 3 shows the unsusceptibility of phosphatic calculi to solutions of the alkaline carbonates. Brodie's method of injecting dilute nitric acid into the bladder was imitated in one experiment, with results confirmatory of his statement respecting the use of this treatment in phosphatic concretions.—*Med. Times and Gaz.*, April 8, 1865.

39. *Description of the Mode of Treating Constitutional Syphilis by Syphilization; and its Results.*—Professor W. BOECK, M. D., of Christiania, describes (*British Medical Journal*, April 8, 1865) his process of syphilization and its results, as he conceives medical men in England are totally unacquainted with the proceeding.

Inoculation, he asserts, "is not entitled to the name of syphilization unless it be continued until the syphilitic matter will no longer take. It is necessary to continue inoculating as long as the virus has any visible effect on the system. Mr. Lee will, perhaps, answer that the virus never ceases to have a visible effect, for this assertion has been made by some; but I know for certain that it does, having myself observed such to be the case in every one of the seven or eight hundred patients whom I have had under treatment.

"The virus seldom loses its power on the system earlier than at the end of three months, and seldom later than at the end of four months and a half. However, after the lapse of some time, it will be possible, by inoculating with syphilitic matter, to produce on the patient a pustule or a sore; and in proportion to the time which has elapsed after syphilization, a greater or less number of pustules can be produced; but these pustules and sores are never so large, and it will never be possible to produce such a series of inoculations as take place during the first syphilization.

"*With regard to the syphilitic virus, the body never returns to the state to which it was before syphilization.* And here lies the turning-point or gist of the whole matter. Here we discover the striking analogy between syphilization and vaccination From this point of view the matter must be considered; and when syphilization has been practised in strict conformity with this theory, the same astonishing results will be seen which for a long course of years I have been able to produce by this method. But people have not cared to consider the matter in this light. The French Academy knocked syphilization in the head without knowing practically anything about it; and everybody has blindly followed the French Academy. The whole affair has been considered as a chimera. What I am most surprised at is that practical Englishmen should have allowed themselves to be led away by mere words, instead of examining the hard facts for themselves.

"*Mode of Syphilization.*—In syphilizing I take matter from an indurated chancre and inoculate each side of the chest with three different punctures. After the lapse of three days I take matter from the pustules, which by that time have made their appearance, and inoculate the sides also with three different punctures on each side, always extracting matter from the last matured pustule for the next inoculation, until this matter no longer takes on the sides. I then extract matter from the sides, and in the same manner as before inoculate the

arms, where it again takes for a few successive times; and proceed in the same manner as before on the sides. When it ceases to have any effect on this part, I take the matter from another patient under treatment for syphilization. This matter will take for a few successive times; and with it I inoculate the sides of the chest and the arms at the same time. When this matter (from the other patient) loses its effect on these parts of the body, I transfer the matter from the arms to the thighs, where it again will take for a few successive times; and, when it no longer produces a satisfactory result, I introduce new matter extracted as before from another patient under treatment for syphilis with syphilization. I now continue on the thighs until the matter becomes inoperative. When the virus ceases to have any effect on the thighs, the patient will either be cured, or every symptom of the disease will in a short time vanish. One or two mucous tubercles will sometimes remain, or an exudation in the throat, etc., but these soon disappear on the application of caustics.

"With regard to the mode of inoculation, it is necessary to be careful to make every group of punctures at some distance from the one previously made; otherwise large confluent sores may result. I would likewise draw particular attention to the necessity of first inoculating on the sides, as chancres on this part of the body are seldom large, and have never, in the course of my experience, become phagedænic. If we begin with the thighs, the chancres will be large, and may possibly become phagedænic, and leave a bad cicatrix. If we finish with the thighs, susceptibility will to a great extent have ceased to exist, and the sores which then arise will neither be large nor deep.

"The different degrees of development which we observe chancres to reach on the different parts of the body, according to the part which has been first inoculated, must be the surest proof that syphilization does not only act locally, but also produces absorption into the system; and that the whole body is influenced by this treatment.

"Syphilization must be adopted in cases of *Constitutional Syphilis* only, it being often difficult or impossible to tell whether constitutional syphilis will follow a chancre; and syphilization ought to be adopted chiefly or only when mercury has not been previously given. Even after mercurial treatment, syphilization is certainly the best method that can be followed; but in that case there will not unfrequently be a relapse; and as long as the doctrine of syphilization meets with such strong opposition, the mercurial treatment previously adopted is liable to be forgotten, and the cause of the relapse to be assigned to syphilization. *In fact, syphilization must be the first method resorted to in constitutional syphilis, and not the last.*

"*Results of Syphilization.*—I will now state the results of syphilization as practised by me in my public ward in the hospital in Christiania. From October, 1852, to the end of February, 1865, there have been 502 patients subjected to the treatment of syphilization, of which number 429 had not been under mercurial treatment. Of this latter number, 384 were cured completely, and 45 have returned to the hospital with a relapse, 28 of whom were not subjected to any new constitutional treatment. In these, external remedies have been alone applied, and in the greatest number of cases only for a few days. Thirteen of the forty-five were resyphilized; and four of them were treated with iodide of potassium.

"Of the 429 there were 42 children suffering from hereditary syphilis. Many of these had atrophy; but I wished to see to what extent syphilization might be practised. Of these 42 children, 22 died. This may, perhaps, be considered a high rate of mortality; but whoever knows anything of the treatment of hereditary syphilis in new-born children will not find this result unsatisfactory. Moreover, of the aforesaid 429 individuals, one child, who was suffering from acquired syphilis, died of croup, and a woman, aged forty, of dysentery. The state of the patient's health after treatment has been most satisfactory. Apoplexy, paralysis, and the numerous internal affections, which are an every day occurrence after mercurial treatment, have never, as far as my experience goes, followed syphilization. Tertiary symptoms have been confined to slightly developed affections of the bones; and of these cases I have seen four.

"In my private practice I have had at least 250 persons under treatment, who,

whilst the treatment was proceeding, were able to transact their daily business. The results of syphilization in my private practice have been still better than in the hospital, these patients having been in easier circumstances. But as their case did not come under the observation of any one but myself, I will say no more regarding them.

"If the results of syphilization be compared with those of mercurial treatment, the difference will be found so extraordinary that the most zealous advocates of the latter must yield their opinion to the force of facts. There is, however, one point in which these two modes of treatment do not differ so widely; and that is, with respect to their several results upon the offspring.

"The effect of mercurial treatment on the offspring has long been known. It is acknowledged as a fact that, when the mother has been treated for syphilis with mercury, the first children have been either in a state of putrefaction, or still-born or syphilitic; and there is no certainty that she will ever give birth to healthy children. I have, however, shown, in my statistical work entitled *Recherches sur la Syphilis* (Christiania, 1862), that when a female patient has been treated for syphilis previously to the age of puberty, she almost always gives birth to healthy children. If a male patient have been treated for constitutional syphilis with mercury, his children will generally be healthy. With but very few exceptions, they will be free from the disease; and even with the exceptions, they will not have it in so high a degree as those born of a mother who has been syphilitic. With regard to syphilization the case is similar; but my experience, which on this subject is not trifling, would seem to justify the idea that the mother sooner begins to have healthy children after syphilization than when the parent has been subjected to mercurial treatment; and if a mother, after syphilization, has given birth to a healthy child, the children born afterwards will not be syphilitic, which they sometimes are after mercurial treatment.

"An attempt has been made to throw obstacles in the way of syphilization by pointing to its results where children are concerned, and alleging its inferiority in such cases to mercurial treatment. It has also been attempted to prove that so-called 'derivation' is not a cause of disease in the offspring; but this is not true, for the case is precisely the same after derivation as after syphilization.

"I have now given a brief description of syphilization as I practice it, and its results; and it would be indeed gratifying to me if its vast superiority over the mercurial system were to be recognized; and, if this is ever to be recognized anywhere, it must be by the most practical of all nations. With regard to syphilization, there are many trifling points to be noticed, in order that the different stages of the process may follow with regularity, and produce the desired result. By long experience I have learned that, wherever syphilization has been tried, it has been rejected on account of inability to surmount the small impediments connected with the system.

"It has been asked in what way syphilization acts on the system; and I must confess that I do not know. The results are plain enough; but how they are brought about I am unable to explain. But do we know more of vaccination and of many other great facts in the science of medicine? It is easy to construct a theory; and it would be strange if I had not formed one after having practised this method for nearly thirteen years; but it will make little difference to me if my theory should be proved a false one, for the facts will remain as strong as ever.

"I consider syphilis to be a disease which has to go through a certain cycle. We often see that it vanishes when left to take its own course; but we are unable to say how often at a later date it may return. I think that all I can say with certainty is, that relapses after the 'expectative method' are less frequent than after the use of mercury. I have shown, in my statistical work above referred to, that no treatment is followed by so many relapses, and gives generally such bad results as the mercurial. The reason of this, I believe to be very simple. Mercury interrupts the cycle which the disease has to pass through; it is not able to break out on the skin and the mucous membranes, and it consequently attacks other organs at a later period. By means of syphilization, syphilis is made to pass through an artificially produced cycle; the course of nature is not interrupted, but, on the other hand, assisted, and sometimes hastened.

"In the course of my practice, I have been compelled, by childbirth or some other illness, to stop syphilization; and, in such cases, relapses have often occurred. The cycle which has commenced is interrupted; and this, I believe, often happens when the disease is left to take its own course; for, during the time that the disease will have taken to pass through its several stages, many circumstances may arise to produce an injurious effect."

40. *Removal of Foreign Bodies from the Ear.*—M. Guersant, in a recent number of the *Bulletin Général de Thérapeutique*, makes the following remarks on this subject:—

If we except the concretions of cerumen that are principally met with in the aged and rarely amongst children, it must be said that foreign bodies in the external auditory canal are more often observed in youth than at more advanced ages. For our part, we have seen a considerable number of them in hospital and private practice.

The bodies thus met with are very diverse: hardened cerumen, pebbles, stones extracted from rings, or ear-rings, pearls, peas, shells, beans, fragments of glass-tubes, balls of paper, seeds, etc. Insects have been mentioned, but we have not on any occasion met with them.

All these foreign bodies, when they remain in the auditory canal, principally those which swell up, may occasion severe accidents: such as inflammation, suppuration, buzzing, cerebral symptoms, meningitis. Hence it is important to relieve, as soon as possible, children who have in their ears a pea, or a seed, which may swell up on becoming moist. The surgeon ought, before all, to ascertain with accuracy that a foreign body exists, because very dangerous attempts have often been made in cases where no such body has been present. If, after the patient has been placed in a proper position, and the light has been directed into the canal, the foreign body is recognized, the surgeon ought to act differently, according to the case.

1. The foreign body may be a fluid: such as water in swimmers, or oil. In these cases, a single shake given to the head has sufficed to make the fluid run out.

2. Sometimes there is hardened cerumen. A simple ear-pick, previously dipped in oil, will allow this concretion to be expelled. It may be necessary first to soften the cerumen by several injections of lukewarm water, or of oil or glycerine.

3. Peas, beans, seeds, or balls of paper swell and soften. They may be caught and hooked out sometimes easily enough, either with small forceps, or with a small short hook.

4. Hard bodies, as pebbles, shells, hard seeds, can be removed in several manners. As was very anciently advised, and as has been done by Menière, injections may be employed. We have, says M. Guersant, very often used these means, and for all sorts of foreign bodies. It is necessary, however, to act in a certain manner, with much perseverance; and the relations ought to be shown how to practise these injections, because it is often necessary to repeat them several days following before success is obtained. In order to apply injections, it is well to procure an Eguisier's irrigator, fitted with a straight tube and filled with cold, or better with luke-warm water. The child should be wrapped in a cloth, folded several times double, so that the arms are thus kept wrapped up; the cloth ought to surround the neck of the child, in order to avoid wetting it. The head should also be held in a somewhat inclined position, and a basin should be placed under to receive the water. The surgeon should direct the pipe of the irrigator into the auditory canal, propelling the jet of water very slowly at first, so that it may pass between the foreign body and the walls of the canal, strike on the membrane of the tympanum, and in its return drive out the foreign body, which will sometimes escape after the first injection. It is important that the surgeon, at the time of performing the irrigation, should draw the lobe of the ear alternately upwards, downwards, forwards, and backwards, in order to modify the direction of the jet. The operation should be repeated several days following, if no results follow the first injection; and the relatives should be instructed how to make the injections. M. Guersant has seen cases in which

the foreign body has only been removed after persevering for eight or ten days. When this means is not attended by success, the instruments which appear most likely to succeed are simple small forceps, which are always useful in cases of soft bodies, paper, lint, etc.; or better, the ordinary scoop or Leroy d'Etiolles' small scoop. In many cases, the instrument should be guided principally along the lower side of the canal. As the introduction of scoops is always more painful than the use of injections, and gives rise to more struggling on the part of children, M. Guersant observes that, when it is necessary to use this means, we should not hesitate to employ chloroform. When the child happens to be manageable, besides the inclined position of the head, M. Debout has recommended the mouth of the patient to be opened. It is sufficient to introduce the end of the little finger into the external auditory canal, and to make the lower jaws move in order to become convinced of the enlargement undergone by the canal each time the condyle of the jaw leaves the articular surface. This attitude facilitates the employment of all the preceding operations; but that which it aids most is the employment of injections.—*British Med. Jour.*, March 4, 1865.

OPHTHALMOLOGY.

41. *Epidemic Disease of the Eye now prevailing in Copenhagen.*—Dr. W. D. MOORE has translated for the *Medical Press*, from the *Ugeskrift for Læger*, an interesting sketch of this disease by C. WITHUSEN.

There were admitted into the Kommunehospital from the beginning of August of last year about 600 patients; the number had steadily increased until the third week in November, when no fewer than 53 cases were admitted, and 49 in the fourth week; from that time the number of cases somewhat diminished, the weekly average of admissions having since been about 20, besides the patients received into the children's department of the St. Anna Hospital, who are probably about as numerous or somewhat less. But, as to the intensity of the disease, the severity of the cases has increased in an alarming degree; on the one hand, many more adults have been admitted, in whom the disease has, on the whole, a much more serious character; on the other, there is a number of patients, in whom it is so malignant that it almost invariably proceeds to complete loss of the eye. While last year the cases presented at most but slight catarrhal conjunctivitis, only exceptionally proceeding to actual blennorrhœa, they are now very general and very dangerous; but besides there are many cases which, without being distinctly referable to the diphtheritic form, have something of that character, and are by no means behind it in danger. Thus the hospital last week received a family, of whom the mother had violent blennorrhœa with a perfectly fleshy chemosis, universal softening with prominence of the cornea, and two days later rupture of this membrane; the husband had on the right eye almost total infiltration of the cornea, and in both eyes blennorrhœa, with chemosis and considerable rigidity of the eyelids. Two children who accompanied them had violent blennorrhœa. Another example is a man, who came in with softening of both corneæ, and in whom, during an attack of delirium tremens, which supervened immediately after his admission, rendering any treatment almost impossible, rupture of the cornea and evacuation of a portion of the vitreous humour occurred at the end of forty-eight hours. His daughter, aged 5 years, had violent blennorrhœa of both eyes, with spots of infiltration of the corneæ, but is now out of danger. A woman came in with considerable blennorrhœa, and notwithstanding active and careful treatment, one eye is now perforated and the other is in great danger. I might mention many other cases where only one eye is attacked, but I will not weary the reader by prolonging this sad list. The hospital has hitherto been so fortunate that, with the exception of the woman last alluded to, none of the cases admitted in an early stage reached such a fearful pitch; where the eye was completely lost, it was on admission already doomed; but it is my conviction that if the

epidemic continues with the same intensity, the favourable conditions which the hospital still affords for treatment will soon be lost in the great overcrowding of its wards.

Prof. LEHMAN, in a letter dated 2d Feb., 1865, states that the disease had not at that time diminished, and that the recent cases are of a more dangerous character than the earlier ones.—*Medical Press*, April 19, 1865.

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42. *Parsley as a Resolvent in Slight Inflammation of the Eye.*—Dr. NEUCOURT considers that parsley is an excellent resolvent in slight inflammations. He states (*Revue de Thérap. Méd.-Chirurg.*, June 1, 1865) that he has often employed a decoction of the leaves with benefit in recent inflammation of the eyes. He applies it by means of a compress wet with a tepid decoction of the leaves, renewed every hour. He states that he cured a labourer, who had been unable to work for eight days on account of acute conjunctivitis, in twenty-four hours by this means.

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43. *Jacobson's Method of Extracting Cataract.*—JACOBSON, in a communication to the Heidelberg Ophthalmological Congress, referring to a pamphlet he had published on the subject, stated that during five years he had operated by his method on one hundred cases, two of which were lost from suppuration; that since that time, in a space of somewhat more than a year, he had operated on a further forty cases, with a loss of only one eye. He then dilated on the three principal peculiarities of his method.

1. *Chloroform is always given to complete narcotism.* The author stated that in about fifteen hundred cases in which chloroform had been administered, in a period of five years, on no one occasion had any signs of danger ever occurred. That vomiting exerts no deleterious influence, if, as soon as its advent becomes apparent, the eye is protected by a charpie compress. If the chloroform had been given to the full extent, no spasms of the ocular muscles or convulsions took place during the operation. Professor Jacobson cited a case, which gave rise to much merriment amongst the audience. He said he had given a man, eighty-three years of age, exactly sixteen ounces of chloroform, and that it was two hours and a half before he commenced his operation! He never gave less than three ounces, generally from six to eight ounces. This, as he justly termed it, "colossal tolerance" for chloroform he was not in a position to account for, unless, perhaps, from the large amount of spirituous liquors that were consumed in his part of Germany (Königsberg). He considered chloroform imperative when any spasm of the muscles of the eye or a fluid vitreous appeared probable.

2. Jacobson always *makes his flap in the boundary-line of the cornea and the sclerotic*, through a vascular structure therefore. To this he ascribed the rapid union of the edges of the wound he had obtained. A second advantage of this method of section was that in case of any retraction of the cornea occurring, this never extended to the line of incision, so that no separation of the edges of the wound took place.

3. He *removes that portion of the iris, after extracting the lens*, which appears to be most exposed to bruising by the exit of the lens. The unusually eccentric position of the line of incision of the flap renders it easy to remove the portion of iris up to its extreme ciliary border.

An animated discussion ensued on the entire question of the methods of extracting hard cataracts.

Arlt said Professor Jacobson's statistics were very remarkable; he himself had only succeeded in restoring vision to ninety per cent. of his patients, the minimum amount of vision being the power of finding their way about alone. He considered suppuration of the cornea a secondary condition supervening in iritis and irido-choroiditis. He saw no advantage in Jacobson's line of section, indeed considered it predisposed to prolapsus of the iris in cases in which iridectomy had not been performed. The size of the section must be regulated by that of the cataractous lens. Iridectomy should not be performed uselessly, for it causes ultimately a dazzling. But Arlt considered it advisable (1) in simple cataracts liable to their cortex rubbing off during extraction; (2) when the pupil did not properly dilate; (3) if the cataract was very hard, and the

section of insufficient size. In these cases the iridectomy should precede the opening the capsule. In the following ones it should succeed it: (1) If the iris has suffered much bruising by the exit of the lens; (2) if any cortical substance is left behind.

Rothmund considered iridectomy should not be unconditionally performed in extraction; he agreed with Arlt in its indications, and did it immediately after the section, contrary to the practice of Jacobson, who first extracted, excepting when any cortical parts of the cataract remained behind.

Arlt appended his experience as to the influence of portions of the cortex of the cataract being left in the anterior chamber. He was, from years' experience, convinced that the swelling-up of such cortical portions often led to the destruction of the eye, especially in over-matured and certain forms of fluid cataracts. If lens and capsule be enucleated in one, no suppuration need be feared.

Dor regretted Professor Jacobson had not more circumstantially given the exact amount of sight his patients had attained. He also wished some further explanations on the enormous doses of chloroform, the tolerance to which could not, at any rate in children, be explained by intemperance.

Jacobson stated circumstances had not permitted him yet to give the exact visual power his patients had attained for a sufficiently long period after the operation.

Sczokalsky testified to chloroform facilitating the operation of extraction. He had also remarked an increasing tolerance for chloroform.

V. Gräfe made the following remarks: In the vast majority of cases the cornea was the first to suffer, the iris and choroid secondarily; he had observed diffuse suppuration and annular abscess of the cornea in a case of irideremia. He protested against Arlt's dictum that no suppuration could ensue if the lens was enucleated with its capsule entire.

He believed that the systematic conjunction of iridectomy with extraction diminished slightly the number of lost eyes, but questioned whether this compensated for the general impairment of vision such patients experienced from the over-large pupil, which failed, as a less pupil would do, to correct, and, to a certain degree, to supplement those imperfections of vision necessary to an absence of all accommodating power. He practically found the enlarged pupil caused in the patients a want of power of exactly localizing their visual impressions.

He stated he was now occupied in analyzing the statistics of the acuteness of vision he had obtained in 1,600 flap-extractions. All he would now signalize was that the operation on the lastly-affected eye yielded by far the more favourable result. He considered certain over-mature cataracts especially dangerous to operate on, not so, as Arlt, however, cataracts with a fluid cortex as with a viscous one that adhered to the capsule. He considered the capsule-epithelium often contributed far more than any cortical *débris*, by its germination, to a disastrous result. He had, however, under certain circumstances, especially in unripe cataracts, preceded extraction by opening the capsule some time before.

Arlt said if the suppuration commenced, as v. Gräfe assumed, in the cornea, it could hardly be prevented, as it was, by compress-bandages, &c. However, what he wished particularly to impress was the danger of leaving any cortical parts of the lens behind. He did not attach so much importance to the general constitution of the patient as was usually done; for how was it that in a double extraction sometimes one eye turned out well whilst the other went wrong.

V. Gräfe adverted to cases in which suppuration of the cornea led to iridocyclitis, morbid changes in the vitreous, retina, &c., and thus the destruction of vision, without this result being directly induced by the corneal suppuration, which might have completely retrograded.

As regarded one eye doing well, the other badly, in a double operation, this might depend on the one being more diseased than the other; this view was borne out by the greater liability to a bad result of the eye which first became cataractous—a fact in itself pointing to the unequally morbid condition of the two eyes. He was satisfied of the importance of the influence of the general constitution of a patient on the result of an extraction.

Arlt said such differences in the two eyes as Professor v. Gräfe alluded to

were possible, but not yet proved. He would again protest against Professor Jacobson's assertion of the innocuity of cortical *débris* left behind after an extraction.

Ruete did not consider small portions of lens-cortex remaining of vital importance, but agreed on the danger of larger ones. He cited a case in which, after an operation for division, the lens-substance swelled up and produced violent symptoms, which entirely disappeared as soon as the pupil was dilated by atropia, to reappear again as the effects of the atropia went off.

Jacobson advised, in case of any residuary cortical fragments setting up irritation, the instillation of atropia every ten minutes. He agreed with v. Gräfe in the origination of purulent corneitis from the wound itself.—*The Ophthalmic Review*, April, 1865.

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44. *Extraction of Cataract by a Spoon.*—Mr. Critchett, in a communication to the Heidelberg Ophthalmological Congress, after adverting to the various causes of failure of the old flap-extraction, passed in review its various modern modifications. Jacobson's method he had practised successfully, but considered the necessary use of chloroform during its performance dangerous. Mooren's method he had never tried. He had done Schuft's (Waldau's) operation more than eighty times, and preferred it to all others. Notwithstanding this, it was open to grave objections. These he had endeavoured to meet, and principally so by modifying the form of Schuft's spoon, for a description of which he referred to the *Lancet*, i. 24. He had performed Schuft's operation with his (Critchett's) spoon upwards of one hundred times, and prophesied that it would ere long completely replace the old flap-operation.—*The Ophthalmic Review*, April, 1865.

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45. *Treatment of Cataract.*—Dr. Knapp is convinced that no one method is adapted for all cases, and that the surgeon will gain the greatest success by careful selection of the operation to be employed in each patient. The following operations were performed during the year:—

		Result		
		Good.	moderate.	Bad.
Flap extraction	29	22	2	5
Linear "	11	10	0	1
Extraction of capsular remnants . .	2	2	0	0
Removal of a wounded lens . . .	1	1	0	0
Discision	15	15	0	0
Reclination	2	2	0	0
	60	52	2	6

Thus the results were generally very good, the only exception being in regard to extraction by the flap-incision. The following was the most mournful case of the whole year: An old woman was admitted who had been blind for five years, and who had been both poor and neglected. When admitted, she was in a state of perfect misery and exhaustion. Shortly afterwards the operation was performed on one eye; there was no accident, yet the globe suppurated. By way of precaution, an artificial pupil was formed in the other eye, the lens being extracted four weeks later. There was no difficulty in the operation, and immediately after it the sight was good. Yet, almost without pain, the corneal flap perished.

Much as the needle has got into discredit in comparison with extraction, yet there are patients whose powers are so much impaired that a large corneal incision cannot be expected to heal. Impressed by the case just related, Dr. Knapp operated on a woman, aged 72, who was in a similar miserable condition, extracting a perfectly mature cataract from the one eye, and depressing the lens in the other. Although iridectomy had been previously performed, and the operation itself was perfectly successful, the extraction failed, whilst the other eye was saved. Both operations were performed at the same time, and when the woman was discharged she could see well with the one eye. Old age, *per se*, does not contraindicate extraction; it is the loss of reparative power that ren-

ders the prognosis unfavourable. Take, for example, the two following cases on which the operation was performed at the same time. The one was a woman of 72, with a very withered skin and weak constitution; the other a woman of 75, but healthy, vigorous, and lively; both came from Mannheim. On the latter, Dr. Knapp felt no hesitation in extracting without any preparatory treatment; the wound healed without the least symptom of irritation, so that in fourteen days she was discharged with good vision. In the other case he depressed the lens. During the next few days there were pains in the eye and forehead, and the globe felt very decidedly hard; glaucomatous inflammation was evidently commencing. Ophthalmoscopic examination on the day following the operation showed that the lens was at the bottom of the vitreous; the media were clear; the optic disk could be seen with perfect distinctness; no pathological change was found, yet the arteries began to pulsate when the eye was gently compressed. Dr. Knapp applied atropia, and remarked to the pupils that he would perform iridectomy if the glaucomatous inflammation increased, or even if it should persist. The examination with the ophthalmoscope did not cause the least pain. Next day the eye was in the same state; on the third the inflammation began to diminish, and in five days the eye was as soft as the other and free from all symptoms. Vision remained good throughout this period. It has, for the six months which have since elapsed, been quite satisfactory. As to the two other unfortunate cases, one eye was lost from purulent inflammation, and the other from internal hemorrhage which occurred during an attack of coughing six hours after the operation; the latter had been quite free from any mishap.—*The Ophthalmic Review*, April, 1865, from *Zweiter Jahresbericht üb. d. Augenheilanstalt zu Heidelberg*, 1863-64.

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46. *Cataract Operations.*—C. ROSSANDER states that the results of extraction at the Great Seraphim Hospital have been by no means satisfactory; indeed, scarcely 54 per cent. were successful. During the last ten years extraction was performed 168 times at this hospital: in 90 of these cases the result was good, in 20 it was tolerable, in 58 unsuccessful (that is, in upwards of a third). Seventy-seven patients were men and 91 women. As to their ages, there were between

10 and 20 years	2
20 " 30 "	11
30 " 40 "	14
40 " 50 "	13
50 " 60 "	37
60 " 70 "	71
Over 70 "	20

Cataract appears to be far less common in Sweden than in Germany, England, or Switzerland. Rossander calculates that in the whole of Sweden, out of a population of four millions, 45 to 50 cataracts are submitted each year to operation.

The author is much in favour of iridectomy as a preparatory step to extraction; he follows the method of Mooren, extracting two to four weeks after the operation for artificial pupil. Out of seven cases treated in this way, the result was in 5 excellent, in 1 moderate, and in 1 the globe suppurated.

In respect to linear extraction and its modified forms, the author holds the same views as von Graefe. Ordinary linear extraction was performed eight times during the last ten years at the Seraphim Hospital; the result was thrice very good, twice moderate, and thrice bad. Linear extraction with iridectomy was twice used; the result was once good and once bad. The author speaks very unfavourably of Schuft's method.

After discussing the various operations in use, Rossander proposes a new mode, which he calls a *modified flap-extraction*. He describes it to the following effect: It is absurd to attempt the extraction of a hard lens through an incision which is absolutely too small, or which necessitates the use of spoons. The question then arises, how large must the corneal incision be to allow the passage of a hard cataract? If in an ordinary extraction we raise the flap formed by half the cornea, or if we try the experiment on a dead eye, we shall find that the aperture will permit the point of the little finger to be introduced into the eye,

and that it is certainly far larger than is necessary for the exit of a body such as the lens. Why then make such an enormous wound when a less one will suffice, and is far less dangerous? The usual method was introduced in order that the lens might pass readily through the pupil; if, however, the iris is previously excised, the flap need not be larger than is absolutely required for the passage of the lens. A flap with a base four lines in diameter is quite sufficient; the difference between this and the ordinary one is far greater than would at first be imagined. Represent the cornea by a circle five lines in diameter, the base of the flap by a cord four lines long, and parallel to the latter draw through the centre a diameter; it will be found that the cord is not half way between the vertex of the arc and the diameter. Owing to the thickness of the cornea, the cord should in practice be placed a little further; the base of the flap should pass midway between the centre and edge of the cornea. The superficial area of such a flap is not half that of the usual one.[1]

These are not mere theoretical speculations. The operation has been performed in seven cases, the cataracts being in six large and hard. In five the lens escaped without difficulty; in the remaining two the spoon had to be employed, not because the aperture was too small, but because fluid vitreous appeared before any pressure was applied. One eye only out of the seven was lost.

The great advantage of this proceeding is the smallness of the flap, which keeps in as good apposition, and promises as favourable union, as the wound formed in the ordinary linear operation.—*Ophthalmic Review*, Jan. 1865, from *Med. Arch. Stockholm; Klin. Monatsbl.* für Augenh., 1864.

MIDWIFERY.

47. *Face Presentation in the Mento-Posterior Position.*—Dr. J. Braxton Hicks read (March 8, 1865) before the Obstetrical Society of London an account of two cases of this, with remarks. He began by pointing out that *a priori* there was no anatomical reason which rendered it absolutely impossible that spontaneous delivery should be effected with the chin posterior in face presentation, even within the range of normal pelvis and head, as represented by some authors. Quotations from the works of nearly all the English authors were given to show the variety of opinions upon the subject. Smellie's case delivered by the forceps was recited, with his opinions and advice upon the treatment of such cases. Two cases given by Prof. Braun were quoted, in one of which the fœtus was delivered by the natural powers, and in the other by the forceps, the chin coming over the perineum first. The author supplied another case in which, after ineffectual efforts to alter the position, he delivered the child alive by the forceps, without any detriment to the mother. The chin appeared first, coming over the perineum. The child was large and the pelvis normal. He also gave another case, where the face descended partly exterior to vulva so readily that, although the chin made the anterior rotation at the last moment, it seemed highly probable that it could have been born by natural powers had rotation been difficult. The state of our knowledge of face presentation was then summed up as follows: That although in the majority of cases the chin rotates forward during the descent in face presentation, whatever was the position it occupied originally, yet in some rare cases the chin passes through the outlet obliquely, while in others the rotation cannot be accomplished at all, either by nature or art. Under these circumstances, in some very rare instances delivery takes place spontaneously, though the greater number of this rare class require the use of the forceps, by means of which either the chin over the peri-

[1] It must not be forgotten that the diameter of the cornea varies considerably, and that in many cases it does not exceed four lines; in the latter event, Rossander's incision would not differ from the ordinary one.—T. W.

neum, or the vertex beneath the arch of the pubis, might appear first. The author thought, from a consideration of the foregoing cases of Smellie, Braun, and his own, in all of which the children were born alive, that provided the chin could not be brought anteriorly, then the head should be brought down in the most practicable mode, chin or occiput first, and not necessarily with the occiput first, as recommended by Smellie.

The President, Dr. BARNES, signalized the value of this memoir as tending to give precision to, and extend our knowledge of, labour with face presentation. His own experience had proved to him that such labours were not so uniformly favourable as was commonly taught. Difficulty might occur at two stages: 1. At the brim; in this case he deprecated the forceps and craniotomy, and recommended turning as giving the child the best chance. 2. In the pelvis; difficulty might arise here in the way indicated in the paper—viz., from the head retaining the position in which it entered the cavity. The proper rotation depended upon a due relation between the head of a live child, or one recently dead, and the pelvis. In Dr. Hicks's case the child was alive; it was, therefore, probable that the pelvis was large in proportion. In such a case he should not despair of turning if art or nature failed to rotate the chin. In cases of due relation of pelvis and child, birth with the chin posteriorly was almost impossible; for in proportion as the face descended, there was a rapidly widening base of a wedge, formed by the occiput bent back upon the child's trunk, which could not pass the pelvis.—*Med. Times and Gaz.*, May 20, 1865.

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48. *Entrance of Air into the Uterine Veins.*—Dr. OLSHAUSEN relates a fatal case of entry of air into the uterine veins. A secundipara of robust frame, aged twenty-nine, was at term. The uterus was unusually distended; no albumen in urine. Labour lingering; uterine douche used. The water was of 30° Réaumur; it was forced into the vagina by a pump, gently. A third injection was made by a midwife. After eight minutes' use the patient began to complain of oppression. The tube was withdrawn. The patient rose in bed, immediately fell back senseless, and died in a minute at most, under convulsive respiratory movements and distortions of the face. Eight minutes later bleeding by the median vein was tried, but only a few drops flowed. On touching the body, distinct and widely-spread crepitation was felt.

Autopsy, eight hours after death.—A large quantity of dark fluid blood escaped from the sinuses of the dura mater. The cerebral membranes very hyperæmic; brain normal; lungs somewhat congested; heart lying transversely, apex in fourth intercostal space. Left ventricle in firm contraction; right quite soft, something like an intestine with thick walls; the coronary vessels contained a quantity of air-bubbles. Left heart had scarcely any blood; the right held little, but it was frothy. *Abdomen:* The distended uterus crepitated everywhere on pressure under the hand. A number of vessels of medium calibre immediately under the peritoneum were plainly filled with air. The right broad ligament was strongly distended with air-bubbles; and this emphysema of cellular tissue extended from the broad ligament through the retro-peritoneal space to the inner side of the right kidney, and even below the liver to the vena cava ascendens. *The vena cava ascendens was enormously distended*—it was at least an inch in diameter. The distension was mainly owing to air. The uterus was divided in the median line. A placenta was attached to the anterior wall; a small flap to the right was detached from the uterus. Another placenta was attached behind and to the right. A larger portion of this had been separated, so that there was a sort of pouch between it and the uterine wall. The two ova were uninjured. Death was caused by forcing air into the vessels of the placental-site. It was concluded that the tube had been passed into the uterine cavity, and that air had been sucked up with the water by the pump.—*Brit. and For. Medico-Chir. Review*, April, 1865, from *Monatsschr. f. Geburtsk.*, January, 1865.

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49. *Continuance of Life of the Fœtus after the Mother's Death.*—Prof. BRESLAU has attempted to solve the question, How long can the fœtus live after the mother's death? by means of experiments on the lower animals. He details and tabulates twenty experiments, the greater number being performed upon

Guinea-pigs. The following conclusions are drawn: 1. The life of the fœtus always endures with a certain independence after the mother's death. 2. The life of the fœtus in the dead mother is very quickly in great danger, which reveals itself in strong convulsive movements. 3. "Apparent death," into which the fœtus commonly falls in the first minute after the mother's death, may be continued in the uterus in extreme cases as long as eight minutes; but mostly death occurs much earlier. 4. The fœtuses removed "apparently dead," from the body of the dead, are nearer to death than to life, for they do not recover by themselves, but quickly, almost without exception, perish. 5. Only seldom, and in the most favourable case, will the young be removed alive within five minutes after the mother's death. Even in the third minute the probability of extracting a live fœtus is very small. 6. If we operate later than five minutes, we cannot extract a living fœtus; if we operate later than eight minutes after the mother's death, not even an "apparently dead" fœtus can be extracted; the young are by that time dead. 7. The mode of death of the mother seems not to be without influence upon the life and death of the fœtus. Death by asphyxia is unfavourable to the fœtus; death by hemorrhage more favourable, so also death by chloroform, and by paralysis of the nerve-centres. 8. It appears to be of consequence for the persistence of life whether the fœtus be mature or immature, but the experiments could not determine this matter. With regard to the applications to the human fœtus and to practical obstetrics, Dr. Breslau submits that: 1. There is no doubt that the human fœtus, like the brute, always survives its mother when the mode of death is rapid and violent, as from bleeding, blows on the head, apoplexy, etc. 2. Daily experience shows that the power of resistance of the human fœtus is greater than that of the brute. 3. The duty of every physician is, after the ascertained death of the mother, to perform the Cæsarean section as quickly as possible, in order to save the child's life. The Cæsarean section may, however, be avoided when the previous death of the fœtus is certain, or when the fœtus may more readily be delivered by the natural passages. 4. The Cæsarean section will give no prospect of a living or of an "apparently dead" child, if not performed within the first fifteen or twenty minutes after the mother's death. 5. If the mother have died from disease, as from cholera, typhus, puerperal fever either during pregnancy or labour, scarlatina, smallpox, etc., there is no hope of saving the child's life. The same will be the case in those poisonings of the mother which effect a rapid decomposition of the blood, and which affect the child, as by hydrocyanic acid. Chloroform-death appears to be an exception, since chloroform, as such, does not pass into the fœtal circulation, of which one may be convinced by any labour completed under chloroform-narcosis. In the discussion upon the memoir in the Berlin Obstetrical Society, Professor Martin observed that in none of the four cases in which he had performed Cæsarean section after the mother's death was a living child extracted. In one the operation was completed within ten minutes; in one it was done "very soon;" in the remaining two it was done within half an hour. Dr. Boehr referred to a collection in *Caspar's Wochenschrift*, in which out of 147 cases only three instances of living children occurred. —*Brit. and Foreign Medico-Chir. Review*, Jan. 1865.

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50. *Action of Ergot of Rye on the Fœtus.*—Dr. M'Clintock read an interesting paper on this subject before the Dublin Obstetrical Society. He maintains that the administration of ergot in the second stage of labour is very apt to be followed by injurious and even fatal effects to the fœtus, and this he ascribes to the violent uterine contractions which the article excites, and which produces an injurious mechanical action on the fœtus.

Dr. M. C. says, 1st, as a general rule, "the danger to the child of giving ergot is exactly in proportion to the energy of the uterine contractions; 2d, where but little uterine action is excited by the ergot it does not seem to exercise a noxious influence on the fœtus; 3d, the evidence that ergot is acting injuriously on the child is derived from the cardiac signs, which become reduced in strength and frequency; 4th, the immediate effect of uterine contraction on the fœtal pulse is to produce a temporary diminution of its force and rapidity; 5th, in the few cases I have seen where violent and continued uterine action took place

from natural causes the fœtal pulse underwent the same changes as after ergot, and the children were born in a highly congested state, dead, or partially aphyxiated, unless delivered soon after the accession of the tetanic contractions of the uterus.

"Of course, it remains for future observation to corroborate or invalidate the facts I have adduced, but assuming them to be correct and well grounded, I think it will be hard to avoid the conclusion, that the action of ergot on the fœtus is due to the uterine contractions excited by the medicine. Let me here digress for a moment. I have had occasion to speak of certain changes in the character of the fœtal heart sounds, and to remark that in one class of cases slowness, weakness, and irregularity are the precursors of the child's death, whilst in other cases on the contrary (not ergot cases, however), extreme frequency and weakness are found to precede the fatal event. Now, the mode or cause of death might account for these differences. I am not now speaking exclusively of cases of ergotic or tetanic labour, I speak of all cases. In cases where ergot has been administered, or where tetanic action was present, the fœtal heart is depressed, and the pulsation slower and feebler; but in other cases, in cases of tedious labour, I found that as the child gets weaker the fœtal heart usually gets more frequent and more rapid until it is almost impossible to reckon its pulsations. The subject, however, is one in every way worthy of being closely investigated, and I would recommend it to some of my junior brethren who have opportunities for prosecuting such an inquiry. If it has no other it will, at least, have this beneficial result, the advantage of which they will find very soon, it will make them quick at discovering the fœtal heart's sounds, and the inquiry will thus bring its own reward with it.

"An interesting question now presents itself to us: How do the uterine contractions operate upon the fœtus? There are three ways, I believe, in which the condition of the fœtus may be affected by the pains: 1st. The umbilical cord may be subjected to direct pressure from the contracting uterus, and if this pressure be so great as to completely stop the circulation through the funis, the death of the fœtus certainly and speedily ensues. This, I believe, very seldom occurs except where the cord prolapses through the os. In other cases, where the cord is pressed upon, this is owing to its being on some projecting part of the child, and the pressure then is only exerted temporarily—viz., during the presence of each pain; 2dly, the compression which the brain and medulla oblongata undergo where the head is wedged or impacted in the pelvis, has been deemed sufficient to endanger or destroy the life of the child, and by some writers this is supposed to be the way in which the child is destroyed after the administration of ergot—compression exerted upon the centres of the nervous system.

"It is very remarkable, no doubt, how great a change of configuration the head of the fœtus may bear consistently with the preservation of its life; but in these cases the change in shape has been slowly and gradually effected, whereas in the case under consideration, compression being produced by strong, violent, and continuous uterine action, the change must, if it takes place at all, be effected quickly, and, so to speak, under high pressure. It is, however, only when there is resistance from the bony structures that pressure on the head can be really dangerous to the child, and therefore I believe pressure alone is very rarely a cause of fœtal death. If what I have just stated be true, it furnishes us with an instance of the occasional antagonism of maternal and fœtal interests. It is desirable for the mother, as Dr. Simpson has very ably shown, that the pressure of the head upon the soft lining of the pelvis should be as transient as possible, but for the child it is desirable that the compression of the head by the pelvis should be slowly and gradually made. Lastly, persistent uterine contraction may affect the child by causing imperfect oxidation of the blood in the embryonic placenta. There are the strongest anatomical and physiological reasons for supposing that the current of blood through the cells of the placenta is checked, if not stopped, during uterine contraction, so that the change from venous to arterial blood in the vessels is thus arrested, or imperfectly performed, just as the current of blood in the pulmonary vessels of air-breathing animals, or in the bronchial vessels of fish, is stopped when the needful supply of air or water is withheld. We can, therefore, have no difficulty in understanding how

pains of a violent kind, at short intervals, or succeeding each other without intermission, can operate prejudicially on the fœtus, nor why the child, when born under these circumstances, so commonly presents a congested livid appearance, and is so apt to be expelled in an asphyxiated condition."—*The Medical Press*, April 19, 1865.

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51. *Extra-uterine Pregnancy in a Woman who had undergone Cæsarean Section.*—In 1863, Dr. HILLMANN, of Bonn, performed the Cæsarean section on Frau K., who had all the symptoms of progressive mollities ossium. In February, 1864, being in the eighth month of her pregnancy, she fell against a hard article of furniture; after which the fœtal movements were no longer felt. In the night of February 12th, labour-pains set in, with discharge from the vagina. On attempting to make a digital examination, Dr. Hillmann found that, on account of the narrowness of the space between the rami of the pubic bones, he could introduce his finger no further than the vaginal entrance; the os uteri could not be reached. He thought it possible that rupture of the uterus might have occurred, with escape of the child into the abdominal cavity; but the general symptoms which should denote such an occurrence were absent, and the labour-pains continued, although feebly. The fœtal heart sounds and movements could not be perceived. The labour-pains gradually ceased; and Dr. Hillmann waited, but in vain, for their reappearance as an indication for further operative proceedings. In eight days, the external enlargement of the abdomen, especially in the ileo-cæcal region, assumed an erythematous appearance; the part was tender to the touch, and felt as if there were œdema of the subcutaneous areolar tissue. At the same time, febrile symptoms appeared; and, as the epidermis desquamated, the patient had occasional sanguineous discharges from the bowels, which required the use of strong injections of acetate of lead to arrest them. On February 27th, an abscess appeared between the umbilicus and symphysis pubis. It broke, and discharged a quantity of fetid liquor amnii. On introducing the finger, Dr. Hillmann felt the body of the fœtus immediately behind the abdominal wall. Subsequently, the right hip of the child, denuded of its epidermis, presented at the opening, and was removed by Dr. Hillmann. Fearing that the continued pressure on the abdominal walls might lead to their laceration, he, after the bladder had been spontaneously emptied, extended the abscess-opening upwards and downwards for about six inches. The child was found entwined by the umbilical cord; it was a male of about a month less than full term, and was dead and putrid. The placenta was found attached in a space between the abdominal wall and the anterior part of the uterus; it was removed with some difficulty, but without hemorrhage. There were no fœtal membranes attached to the placenta, and none had been discharged from the vagina; Dr. Hillmann puts it as a physiological question whether the serous membrane of the abdomen may not have discharged the duty of the membranes. The wound was closed and dressed with infusion of chamomile. The progress of the patient was satisfactory; on March 8th, she was able to leave her room for the first time, and in six weeks the catamenia appeared, and afterwards returned at regular intervals of three weeks. On examination of the abdomen in September, the cicatrices of the two incisions were seen crossing each other at a very acute angle. In that left by the first Cæsarean section, the tissue had given way, so as to produce a hernia. On making a vaginal examination in the middle of October, and gently pressing on the hypogastric region, the anterior lip of the uterus could be felt. The patient was in as good health as could be expected in the circumstances.—*Brit. Med. Journ.*, Feb. 25, 1865, from *Berliner Klinische Wochenschr.*, Nov. 21, 1864.

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52. *Puerperal Fever.*—Dr. T. SNOW BECK read a paper on this subject before the Obstetrical Society of London, Feb. 1, 1865. He related minutely the case of a young lady, aged 24 years, who was confined of her first child, presented symptoms of puerperal fever on the second day, and sank three days afterwards, or on the fifth day after her confinement. He pointed out that the leading feature in the case was the absence of that contractile power of the uterus necessary to the expulsion of the child and provide for the safety of the mother

after its birth, this being apparent at each stage of the labour—the languid contractions of the uterus, the inability to increase the force of these contractions by the usual agents, the requirement for the use of the forceps, the necessity for the removal of the placenta, the hemorrhage which followed, the existence of a large flabby open uterus when the hand was introduced, the great difficulty to induce sufficient contraction of the organ to prevent further hemorrhage, and the impossibility to procure a firm persistent contraction after the cessation of the hemorrhage. This lax condition of the uterus permitted the uterine sinuses to remain pervious, and arose from the absence of that due contraction of the muscular tissue which is essential to prevent any fluids circulating along their canals. Another case of puerperal fever was given, which also occurred in a healthy young woman, after apparently a perfectly natural labour, and which proved fatal on the ninth day. The body was examined thirty-six hours after death, and copious effusion of fluid into the abdomen, with shreds of soft friable recent lymph, and some injection of the peritoneum, were found. The uterus was large, pear-shaped, even on the surface, soft, and rather flabby; its interior was everywhere covered by a soft membrane, which presented the usual microscopic characters of the mucous membrane, and was covered by a red mucous secretion. All the tissues of the uterus were examined, and found to be perfectly healthy: no appearance of inflammatory product presented itself in any part of the organ. But the uterine sinuses were open, and water thrown into the larger veins of the abdomen readily traversed these canals, and escaped at the open orifices on the surface of the uterus. From the careful examination of these cases, the following deductions were drawn: 1. The phenomena of puerperal fever may be produced by the introduction of poisonous fluids into the general system. 2. The uterine sinuses remaining pervious to the flow of fluids would afford a means by which the poisonous fluid or fluids would enter the system. 3. The pervious condition of the sinuses remained in consequence of the absence of that firm and persistent contraction of the uterus after childbirth which appears necessary to effectually close these canals, and prevent all circulation of fluid along them. 4. The secretion from the interior of the uterus was probably sufficient, when mixed with the blood, to induce the effects observed. And it would further follow that—5—the various phenomena observed in puerperal fever may arise from this cause, modified infinitely by many incidental states; and the various inflammatory actions and products observed in the course of the disease would not be the essential parts of the disease, but morbid phenomena which occurred during the course of it. 6. The primary, though not the only, object in the prevention of these attacks of puerperal fever will then be to procure a firm, complete, and persistent contraction of the uterus after the birth of the child, and thus effectually to shut off all circulation within the vessels of this organ. The author considered that these cases gave a decided negative to the opinions that puerperal fever was caused by uterine phlebitis, lymphangitis, endometritis, metritis, or any similar inflammatory condition of the uterine organs, as no product of inflammation was anywhere discovered after a careful and even microscopic examination. The results were also opposed to the opinion of Cruveilhier, who compared the internal surface to a vast solution of continuity, and the gaping orifices of the sinuses to the open-mouthed vessels of an amputated limb. For here the internal surface of the organ was everywhere covered by a soft membrane containing all the elements of the mucous membrane, and covered by a red mucous secretion; whilst the gaping sinuses could only be compared to the open-mouthed vessels of an amputated limb when the uterine sinuses were pervious and admitted fluids to circulate within them: the real point of comparison not being the open orifices, but the open canals leading from these into the veins of the general system. The comparison between puerperal fever and surgical fever was also founded on an erroneous basis; for again a natural condition of the vessels of an amputated limb was compared with an unnatural state of the vessels of the uterus, which ought not to be, and might in the majority of cases be prevented. The propositions given by Dr. R. Ferguson in his valuable essay on Puerperal Fever were examined. The author differed essentially from Dr. Ferguson on the causes of the vitiation of the blood and on the varieties of puerperal fever. The effect of this noxious

impregnation of the general system was next considered, and it was shown that the quantity modified the result in a most singular way—a small quantity being eliminated by intestinal or urinary secretion, whilst a larger dose killed. When the uterus was very lax, and admitted of a ready flow of noxious fluid through the sinuses, the woman was stricken down as if by some fell pestilence, and sank in a few hours—"where the secretions are all suspended, and the patient sinks with rapidity." Where the deleterious fluid is introduced in smaller quantity, the system, after a vain struggle with the poisonous infection, sinks in a few days, the chief morbid appearance after death being extensive peritonitis of a peculiar character, copious exudation of soft friable lymph, and much serosity. To a yet smaller amount of deleterious impregnation were attributed uterine phlebitis, metroperitonitis, distension of the lymphatics with purulent fluid; the effects being more local, and the inflammations being the consequences of the first changes induced. Whilst a still smaller amount of infection would produce low febrile conditions, extending over an indefinite period, and sometimes inducing purulent infiltration in various organs of the body. Each of these states being influenced by a variety of concomitant circumstances—as the original condition, state of health, the character of the fluids secreted, the existence of any diathetic disease, epidemic influences, etc. On the question of contagion and the occurrence of epidemics, the author showed that the most experienced in this disease varied so much that no decided conclusion could be drawn. The prevention of the disease, it was urged, could be most effectually accomplished by procuring a complete and persistent contraction of the uterus after the completion of the labour; and that the means usually recommended were not sufficient for this object, it being generally considered sufficient to procure such an amount of contraction as to prevent any hemorrhage, though it was necessary to go beyond this point of contraction before the safety of the woman could be secured. A nourishing and supporting diet was also necessary to remove the physical fatigue and mental anxiety of the labour, to restore the health from the waste occasioned by the previous months of pregnancy, and to enable the woman to pass through the subsequent changes which had yet to take place: much, however, depending upon the previous habits, state of health, and other incidental circumstances. On the subject of treatment, when the disease was once developed, the principles were considered to be—(1) to prevent the further injurious impregnation of the system, either by obstructing the further flow along the uterine sinuses, or by removing the noxious fluids from the interior of the uterus; (2) by supporting the system during the struggle in which it is engaged, and by meeting any incidental complication which might present itself; and (3) perhaps a further source of treatment was now afforded, which might enable us to counteract, to some extent at least, the deleterious impregnation which has already taken place. The first would be attained by procuring, if possible, the further contraction of the uterus, or by inducing the coagulation of the blood in the uterine sinuses. But the principal curative means appeared to rest upon the removal of all noxious fluids from the interior of the uterus, by cleansing it with a tepid solution of any sulphite or hyposulphite of soda each day or oftener; and should any fluid gain entrance into the uterine sinuses, it would probably be more beneficial than otherwise. The means to support the system were too well known to require further notice; whilst deleterious impregnation, which had already taken place, might be met by the internal administration of sulphite of magnesia or lime, in doses of one scruple to half a drachm every two or three hours.

Dr. Graily Hewitt stated that he had long entertained the idea that a very close connection subsisted between a loose relaxed condition of the uterus after delivery, and the supervention of puerperal fever. He had followed a plan of treatment based on this idea, and had frequently insisted upon it in teaching. He considered that the author of the paper had offered anatomical proof of what had been a matter of surmise among many obstetric authorities of late years—namely, that puerperal fever and allied disorders are not necessarily and inseparably connected with the existence of inflammatory changes in the tissues of the uterus and neighbouring parts. He believed, with the author, that the disease arose from the introduction of putrescent or decomposing material into the ute-

rine sinuses, and thence into the general circulation. This was the case in by far the majority of instances, but he believed that the poison was sometimes introduced by other channels. He could not regard puerperal fever as a disease *per se*, and he considered it would be difficult to distinguish anatomically and pathologically between ordinary puerperal fever and that condition produced by the contagion of scarlet fever or other fevers in the lying-in woman; for though the cause might be different, the effect was or might be the same. The essential part of puerperal fever is poisoning of the blood, and this may be effected in various ways. He had, as he had already stated, observed a very close connection to subsist between the relaxed uterus and puerperal fever: he had always found the uterus larger than it should be at the outset of the attack, this increase of size being accompanied with tenderness and other signs. In this respect, therefore, he quite agreed with the author of the paper. It would afford confirmation of the truth of this view of the subject to describe the treatment which he (Dr. Graily Hewitt) had for some time adopted in cases of puerperal fever and its results. Disregarding entirely and completely the old ideas as to inflammatory changes in the uterus, he was in the habit of applying the bandage very tightly over the uterus the moment the first symptoms appeared, and of administering internally a stimulant diet, including large doses of alcohol. Other remedies were used, but they were quite subordinate. Depleting and lowering medicines were wholly omitted. The quantity of alcohol given was sometimes at the rate of as much as two ounces of brandy every two hours. This treatment he had seen cut the disease short in the course of twelve hours. He had the greatest confidence in the efficacy of such treatment in bad cases of puerperal fever, having seen not a few apparently hopeless cases recover under it. In reference to the prophylaxis of the disease, these observations were interesting. The binder served a very important purpose, and he was in the habit of paying the greatest attention to its careful application; believing that in a well-contracted uterus we have the best safeguard against puerperal fever. The facts related by the author of the paper bearing on this latter subject were very important.

The President, Dr. BARNES, agreed with Dr. Beck, that puerperal fever was a distinct thing from typhoid or scarlatina, which often attacked puerperæ, but preserved their essential characters. On the leading idea of the paper—the necessity of contraction of the uterus as a preventive of puerperal fever—he would say, that contraction was eminently desirable to accomplish, but he had seen repeatedly puerperal fever occur in women after perfect contraction, and, on the other hand, no puerperal fever, although the uterus remained relaxed. After the great discussion at the Académie de Médecine, Dr. Martineng published a memoir setting forth this view, and advocating the use of ergot and all means to insure contraction as preservative against fever. Dr. Barnes, having under observation 2000 or more cases yearly of poor women attended by the Royal Maternity Charity, thought he was able to negative the proposition that puerperal fever was more frequent amongst the poor and badly fed. The cases in the Charity were very rare. For one case amongst these women, he saw ten amongst the easier classes. As a means of preventing the loss of blood—as hemorrhage undoubtedly predisposed to puerperal fever—he had found nothing of equal efficacy to the injection of a solution of perchloride of iron into the uterus after clearing out the cavity of placental remains and clots. He had used this plan for several years, and in a large number of cases after labour and abortion, and had always had reason to congratulate himself upon the result. The perchloride of iron had the further advantage of being antiseptic. He had certainly saved several women from death from flooding, and believed these and others had been rendered less liable to puerperal fever. In reply to a question from Dr. Timothy Pollock, the President stated that the plan he adopted was to carry in his "obstetric bag" a saturated solution of the salt. Of this solution he used one part to eight of water. But he thought that even a weaker solution was sufficient. It instantly coagulated the blood in the mouths of the uterine vessels.

Dr. SNOW BECK stated that he had used the soluble sulphites as injections for cleansing the interior of the uterus, from the opinion that they were the most

effectual agents in correcting the condition of the fluids secreted. But he had no doubt other agents would be found equally and perhaps more efficacious, and amongst them probably the preparation of iron mentioned. But if it were even admitted that this plan of treatment were advisable, and devoid of the great danger sometimes attributed to it, then an important step had been attained. He, however, would strongly urge the necessity of procuring complete and persistent contraction of the uterus, and of carrying this contraction further than was usually considered sufficient, as being one of the most effectual means of preventing this most serious disease.—*Med. Times and Gaz.*, April 15, 1865.

HYGIENE.

53. *On the Contagious Affections of the Eye.*—Mr. Haynes Walton read (May 20th, 1865) an interesting paper on this subject before the Metropolitan Association of Medical Officers of Health.

After some introductory remarks, he said: "The word contagious is used by the profession for the most part as synonymous with infection, but some among them employ the latter in a sense that the former does not admit of—namely, that of contamination by anything injurious to the human frame from any source. I wish to express by it the communication of ocular disease from one individual to another. The direct effect of contagious influence on the eye appears only in conjunctival affections—*i. e.*, inflammation of the conjunctival membrane and of the Meibomian glands, attended with puro-mucous and purulent discharge; but from this surface and single tissue implication, the organ of sight suffers more distress from permanent injury and from complete spoiling, than from all the other diseases which invade it. Yet only some of the forms of the contagious inflammations are recognized, and with scarcely any of them are rules for preservation sufficiently applied, by which I mean those that are really of practical application, for, as in everything of the kind, such treatment can never keep pace with our knowledge for the necessity of it. Nor are the morbific causes which originate them sufficiently taught. I regard all the puro-mucous and purulent diseases as contagious. In some instances the milder forms of some of them, together with the absence of severe ulterior consequences, have been perhaps the cause of this fact being overlooked, or but very partially recognized. If my friends should detect any discrepancy between my former statements and these, they must receive in explanation a wider field for observation and more accuracy in reading disease. Catarrhal ophthalmia, rightly so called, is too well known to require any careful description. It is enough for me to speak of it as conjunctivitis with a puro-mucous discharge, the eyeball proper being unimplicated. The general tendency of the affection is not to invade other ocular tissues. To trace it to an atmospheric origin is generally easy, but that it is contagious can unequivocally be shown. The commonest instances of the contagion are to be found among the poor, not only because of the close proximity of individuals, but of the auxiliaries to be found among their home dwellings that favour its conveyance, and the kindred disadvantages arising out of the communities which legislative enactments provide for them. These vital and physical causes greatly increase the extent of contaminating force. According, then, to the opportunity for this leavening influence, so, most assuredly, will be the propagation of the ophthalmia, and in recognizing which we shall be the better prepared with our treatment. I have witnessed the contagion of catarrhal ophthalmia on a grand scale, I have personally inspected the individual suffering it has occasioned, and I can tell of the obstinacy of its duration. In the year 1861 I was sent for by the guardians of the Central London District Schools, which receive the pauper children of five unions, in consequence of an ophthalmic affection that existed, requested to examine the diseased inmates, and to make a medical report. I may mention, in parenthesis, that the disease had existed prior to the year 1858, although I

was not aware of it, and I get my information from this paragraph, which I take from a report made after my visit by a committee appointed to examine into the state of this and other pauper schools: 'On a careful consideration of the information gained by their visits to these schools, the Committee regret that it is their duty to report that the children at the Central London District Schools present the least satisfactory general appearance, and that this arises principally, though by no means entirely, from the prevalence of an ophthalmic affection. The Committee find that a very large proportion of the children are so affected, and have been so, both before, and continuously since, a similar Committee visited the school in 1858.' There were many hundred children there; I believe some twelve or fourteen. I examined with care, taking notes as I went, two hundred of them affected with ophthalmia, and I well remember the long and tiresome job. I beg to draw attention specially to the fact, significant as I shall show, that there was catarrhal ophthalmia, and nothing more—mild in form, yet definite in symptoms. It had not in a single instance passed into the form of purulent ophthalmia—the most fatal malady to which the eye is subject, and the cause of the greater proportion of blindness in the world. No part of the eye besides that immediately attacked suffered. In not a single instance was the cornea implicated—no ulceration, no sloughing, no opacity. The conjunctiva alone and the Meibomian apparatus were diseased. In a few instances I detected the remains of former eye complaints. It would be scarcely possible to find this number of pauper children under one roof without some marks of strumous ophthalmia. I was struck with the miserable appearance and stunted growth of the children in general; and the answer to my remarks respecting these was, that they could not be otherwise, as they were all bred and born on gin and sprats. I found the clothing very scanty, the diet meagre and badly cooked, and the supply of warmth insufficient. So excessive was the ventilation in the dormitories that, during the previous winter, sometimes the temperature fell to 32°, and with the fires and gaslights it was usually at 45°. I believe it has long been a prevalent opinion, and which has even been taught by some of our authorities, that this ophthalmia, as excited by atmospheric causes, is scarcely, if at all, contagious, as contagion is ordinarily conveyed without palpable inoculation, and other means cognizable to our senses, except it assume an aggravated or virulent form. I find, too, that this opinion was entertained by a surgeon in London of the highest ophthalmic eminence, who visited the school in 1858 with reference to the ophthalmia. He says, in the report of the Committee already quoted: 'Such a complaint is liable to assume more or less of an epidemic character, and may even become contagious.' It has not, however, changed its type; it could never have been less than catarrhal ophthalmia; it could never have been more, and I do not think that any one will doubt the contagion; there could be no question about it. The fullest opportunity was afforded for it, because there was no precaution taken against the occurrence; the diseased and the healthy intermingled. The virus must have been frequently carried by direct inoculation of the recent secretion, as well as by the more general, but subtle, and less cognizable ways of the transfer of particles of poison through the atmosphere. If, therefore, it is proved that catarrhal ophthalmia can be a great curse in a large establishment, without actually spoiling eyes, should there not be much care bestowed in checking it and much supervision exercised? Besides, very trustworthy observers assert that slight circumstances may convert catarrhal into another and severer ophthalmia; and hence has arisen the scourges of this kind in past years in our fleets and armies. That the ophthalmia had not passed into a severe form after so long a time may be considered unusual, although not unaccountable, when the surrounding circumstances are examined. There were absent the conditions for such development. The children were not in the least crowded. There was not any foulness of atmosphere; on the contrary, the entire building was over-ventilated. The utmost cleanliness was observed in the whole detail of management, and the best surgical measures were applied. It was very different, however, with the memorable ophthalmia of the workhouse schools of the Tipperary and Athlone Unions in 1851. I learn from the report of Sir W. Wilde that in the Tipperary establishment the ophthalmia was introduced into the schools in

a mild form, and, as I believe, of the catarrhal type, in the spring of the year, and in October it assumed a more violent and decided character. It there met with a hot-bed for growth and contagion. But it was to be yet further intensified in the workhouse. After Sir William had described the state of those who were seeking admission to this overcrowded and degraded place, as being worn out by previous want and privations of every kind, exhausted indeed to the last degree, he said, 'The general health of the workhouse was very bad indeed. We had cholera, dysentery, fever, and smallpox, as well as several cases of gangrene and dropsy. There was no proper sewerage, neither was there sufficient water to cleanse the entire house or purify the privies, except what a horse brought daily from town.' Being anxious to know what is the present state of the Central London District Schools, I wrote a few days ago to the gentlemen who was surgeon there at the time of my visit, requesting certain information. These are his answers: '1st. The ophthalmia no doubt originated through the admission of three or four hundred children from another school where there had been an outbreak. Secondly. I believe it has not disappeared. I resigned three years ago, as it made too great claim upon my time. A surgeon now resides upon the premises. While I held the surgeoncy, my own assistant, and two others specially engaged for the eye cases, devoted their whole time to the treatment of the children. About four or five hundred cases were at one time under treatment, most of them mild, some chiefly discoverable through the condition of the inner surface of the eyelid. I believe one or both of the ophthalmic assistants remained for a year or two after my resignation. Thirdly. The disease yielded to rigid separation of the disease from the healthy, and mild astringents occasionally. These applications were injected thoroughly under the eyelids, and the utmost cleanliness was at the same time observed, carried out by a largely increased staff of nurses. Fourthly. I regard the disease as only kept under, and circumstances might reproduce it at any time. It is the bane of these large pauper schools, and unmanageable when it once breaks out.' It is now time to say something about treatment; and have I not been anticipated in this? Has not each of my hearers determined for himself, on his own conviction, the one, and the only one, remedy to be depended on? Who will not say, remove contaminating influence? How this should be done effectually can only be determined when a multitude of other circumstances are examined and considered. It may happen that the separation of the sound from the unsound to the greatest extent afforded by any vast building might be inadequate; but migration of the one or the other to new premises absolutely required. I understand that all the hints which were given by other medical men and myself as to the hygienic deficiencies were attended to, and all the ophthalmic treatment was carried out; but yet you hear the disease is not eradicated. It is, then, the question of prevention which is to be worked out; and fortunate will it be for the public if there should be enough vitality in the meeting of this evening from which shall spring some sources of investigation and observation to discover knowledge to be applied whenever such disease, or a still more severe one, rages, which shall stay the pestilence. I shall not waste our time in talking about ophthalmic treatment; that is almost beyond the question. Then there is scope for difference of opinion, and who is to arbitrate? But on the grand radical matter of isolation I suppose common sense forces us to agree. I hope, sir, that we shall have expressed presently the individual experience of many of the members on this point. For my own part I venture in all such epidemics these suggestions: Absolute separation of the diseased persons from the healthy. Among the diseased also I should extend the classification, if severer cases occurred, for obvious reasons; and it may be wise to have several of these draughtings. The institution of a rigid convalescent system of probation, to prevent relapsing cases from doing mischief. A morning and evening inspection of the whole establishment, so that there may be the most timely removal of diseased individuals. The strictest attention to the withdrawal of any known or supposed exciting cause of the disease. The adoption of the highest hygienic measures among those who are under surgical treatment, so that there may be the prevention of those circumstances and conditions that are likely to intensify the disease. I propose next to make some remarks about purulent ophthalmia

in infants. This dangerous complaint is generally supposed to be almost entirely confined to the lowest ranks of life; a very erroneous impression, although among the poor its ravages are much greater from want of early recognition and proper treatment. I need not take any notice of its contagious nature, as it is seldom so propagated, except in Foundling Hospitals on the continent, and in a few other uncommon ways, because of the isolation in general of the child, and the fact that the mother and the nurse exercise care about their own eyes from the notoriousness of the danger of the disease, and, in addition, the caution usually enjoined by the medical attendant. It is to the origin—the infection, I suppose, I must call it here—that I wish to direct attention. It has been my impression for many years that the laws of preservation might be extensively and effectually applied, and, besides, that the disease, when taken, might be divested of its severity, and its frightful ravages thereby averted. Let me inquire how infant purulent ophthalmia originates. Very, very often, by inoculation with leucorrhœal matter from the mother, by gonorrhœal inoculation from the same source, and sometimes we cannot tell how. Some supposed cases of it called mild are nothing of the sort, but merely catarrhal inflammation. I ought to tell you that the chief difference between these is, that in the purulent ophthalmia the palpebral conjunctiva is more quickly and intensely diseased, its papillary structure getting changed into the state we call granular; hence the mattery discharge and the amount of it. If any one takes the trouble to make inquiries about the state of the mothers of these diseased children, he will be astonished to find how often the leucorrhœal infection prevails. He must not always expect to get the truth by direct inquiries. I should like to ask this question of the accoucheurs, In any well-marked case of leucorrhœa is it practicable to wash out the vagina in the commencement of parturition, so as to prevent the transmission of the disease, and can the object be the better secured by the use of chemical agents? Although I lack information on this point, I can give valuable suggestions on another. Cleanse the eyes of children born under such circumstances at once and most carefully. Daily inspect them, and apply treatment when requisite without delay. I never saw an eye lost that I treated early—that is, before the cornea was affected. Hundreds of eyes would annually be saved if this watchfulness were adopted. What hints for those who have the charge of parish midwifery! Why not tell the mothers of the contingency, and get their watchfulness too? I have found that a premature child seldom escapes maternal infection. The last four cases of purulent ophthalmia that I have had in private practice have been from leucorrhœal matter. Two of the children were premature. Of course infection is not inevitable when leucorrhœa is present. It is here as in other things, infectious and contagious: the escapes cannot be accounted for. Infantile purulent ophthalmia, from the infection of gonorrhœa, is very much less common, and is almost entirely confined to the children of prostitutes. The remarks that I have made about prevention in the last named form of the disease are equally applicable here, and it should be remembered that the gonorrhœal form is the more severe. I shall conclude by making some few and short remarks on the contagion of granular conjunctivitis. Granulation of the eyelid is the term generally used. This is the sequel for the most part of the purulent ophthalmia. The under eyelid is generally the more affected. Strictly, pathologically speaking, it is chronic hypertrophy of the conjunctival villi, and I need not say any more on this head, nor describe the appearances, for everybody must be familiar with what I allude to. There is, too, an accompanying characteristic inflammatory state of the cornea, with more or less of haze or opacity, and redness of the tunics immediately around. This state of the eye is an unexpected source of frequent contagion. It is a deceptive state. I will explain. A true granular eyelid is seldom seen, except as a chronic disease, and it may be a very chronic one. Should there be still any purulent secretion, it is generally scanty and thin. Now the duration and the absence of well-marked pus generally prevent, in the minds of the medical attendant and others, the idea of contagion. But there is a still more disarming state. The granular conjunctiva may exist along with the vascular state of the front of the eyeball, and without any purulent secretion. No one not versed in ophthalmic disease would suspect any contami-

nating danger. But the danger is merely masked. Apparently slight causes, atmospheric changes, fatigue, irritation from dust, or the application of irritating drugs, drunkenness, seem to reproduce the discharge, sometimes with all the former severity, and a patient supposed to be harmless may then inoculate many of those around him with purulent ophthalmia. This granular eyelid clings closely to the poor Irish. At our Ophthalmic Hospital we call it the Irish eye. It is always among the abodes of them in all countries, and I do not think that it is due, as some say, to peculiarities of Irish constitution, but to mere contagion. The Irish take it into our workhouses, schools, and prisons. Yesterday I saw a fine-looking girl in the street, about 14 years old, selling flowers, with a pair of well-marked Irish eyelids. I alighted, and went to learn her history. She was born in England, of Irish parents, and lived in an Irish community. I offered to have her eyes attended to, but she thanked me with 'No;' adding, 'I have some eye-water, sir.' Here is a great scope for the application of preventive measures, and the special field for it is in those establishments which receive the poor, and in which there can be proper supervision and separation. I would subject the unfortunate possessor of granular conjunctiva to the same rules and regulations as if he were in an acute stage of purulent ophthalmia."—*Med. Times and Gaz.*, May 27, 1865.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

54. *Definition of Toxicology.*—M. Tardieu holds that toxicology does not exist as a true science; it is only an artificial assemblage of certain notions on chemistry, natural history, physiology, nosology, pathological anatomy, and therapeutics, having reference to divers substances, so-called poisons. Again, poison itself has neither existence nor individual characteristic. This is shown by the differences of definition of the word poison, the last of which, by Orfila, and the best is—"that the word poison may, and ought to, be given to every substance which, taken internally, or applied to the bodies of man or animals, destroys health or annihilates life by acting in virtue of its nature." Poisons do not constitute an order or a natural group the essence of which may be defined or characterized, while all substances without exception, which deserve the name, lose or acquire, according to certain external circumstances, their poisonous properties, the medicinal property being always contained in the poison, and the poisonous not being separable from the medicinal property. Toxicology, in its extreme factitious meaning, is forced to set out with the false notion of poison; it studies without method and without processes that are proper to it; and it borrows from physic, chemistry, and botany, the greatest part of the gifts which it appropriates, but which cannot furnish it with the doctrinal principles that are wanting in it. Poisoning, continues the author, in a medico-legal point of view, is one cause of violent death, and ought to be studied as such, in the same way as strangulation, asphyxia, and wounds of all kinds; poison, in fact, is a weapon in the hands of the criminal, and nothing more. It only exists in the condition of having acted; it only reveals and defines itself in its effects—that is to say, in the poisoning; the result is that legal medicine, called in to seek out and determine the cause of every violent death, ought to set out from the fact of the poisoning, and not with the notion of the poison, and should only occupy itself with the poison secondarily, with its state, nature, and physical characteristics; like as in assassination committed by means of a poniard or pistol, the expert examines the murderous weapon, brings it to the wound, and compares it with the injuries that have been inflicted. —*British and Foreign Med.-Chir. Review*, April, 1865, from *Annales d'Hygiène Publique*, October, 1864, and January, 1865.

55. *Elimination of Poisons from the Body.*—M. Tardieu remarks that the elimination of a poison commences from the first moment of the poisoning, and

almost instantly after the absorption; if life should continue, the elimination will terminate at the end of a given time, and it would be very useful to determine this time precisely. The period of elimination is very variable, that is undoubted, and it varies under certain conditions which are not yet sufficiently known. The elimination must, like absorption, vary according to special physiological circumstances in the animal species, and according to individual organic conditions, the influence of which it will always be difficult to appreciate with exactitude. M. Chatin has, however, conceived that a law of elimination could be established, and has advanced the statement that the rapidity of elimination in various animals is in an inverse ratio to the faculty of their resistance to the poison—that is to say, a poison will remain so much the longer in organs the economy of which is least affected by it. There is variation also in respect of the duration in each kind of poison, and science is indebted to M. L. Orfila for setting the initiative of very useful, but unfortunately as yet unfinished researches. From these experiments, which are, perhaps, wanting in multiplicity, it results that the elimination of arsenic and corrosive sublimate is complete in thirty days; of tartar emetic, tartrate of antimony, in four months; of nitrate of silver in five months; and of acetate of lead and sulphate of copper after more than eight months.—*Ibid.*

56. *Can Poisoning occur and the Poison disappear?*—On this point M. TARDIEU is of opinion that a poison, almost in its totality, may be vomited and expelled the organism; but it is very rare, and nearly impossible, if the patient live, for a certain portion of the poison not to be absorbed and excreted so as to be detected by analysis in the excretions; it is also rare, if the patient die, for no portion of the poison to be detectable in the various organs into which it would be carried by the circulation. The true question consists in asking—do traces of poison remain in the living body for a determinate period, or does the poison remain indefinitely in the dead body? On this last point the author states that mineral substances resist indefinitely, but they do not escape transformation; some are fixed in such stable combination that chemistry will always detect their presence. Others, on the contrary, by being rendered soluble, are exposed to the possibility of being carried away from the debris of the body in the process of decomposition. Ammonia, which is produced in putrefaction, is the basis of these combinations; but the slowness with which the combinations form, and the still longer time they require for their complete dissolution, under the ordinary conditions of burial, leaves room to say that even after several years, and so long as any part of the body remains, chemistry can find the traces of mineral poisons in exhumed remains. Organic substances, or at least the greater part of those used as poisonous agents, notably the vegetable alkaloids, resist with remarkable fixity and for a very long period. At the same time science cannot say that the organic series are as fixed as the inorganic.—*Ibid.*

Dr. B. W. RICHARDSON states (*Brit. and For. Med.-Chir. Rev.*, April, 1865) that he has detected tartarized antimony in the bodies of animals four months after the last dose of the poison had been taken, the liver being the organ in which the poison was stored. The observations of M. Tardieu on the resistance to decomposition of organic poisons laid up in decomposing organic remains, are worthy of note. We remember seeing Messrs. Rogers and Girdwood demonstrate the presence of strychnia in the rotton tissues of an animal that had been dead two years as perfectly as in a solution of the poison recently made.

57. *Laceration in a New-born Child.*—Mr. R. KING PEIRCE showed to the Obstetrical Society of London (April 5, 1865) a fœtus, born at full time, and exhibiting at birth two lacerations: one extending through the integuments transversely across the abdomen, about the level of the scrobiculus cordis; a second one across the throat, exposing all the vessels and muscles of the neck. The two lacerations had all the appearance of incised wounds; but the evidence was clear that they had not been produced by any act of violence other than that of rapid delivery.—*Lancet*, June 3, 1865.

AMERICAN INTELLIGENCE.

ORIGINAL COMMUNICATIONS.

Rare Case of Double Dislocation. By J. H. POOLEY, M. D., of Yonkers, Westchester Co., N. Y.

About nine o'clock on the evening of Feb. 15, 1865, I was called to see a man who had walked into the open trap-door or grating of a cellar opening on the sidewalk, and met with a severe injury to his shoulder.

The patient was about thirty years of age, dark complexion, black hair and eyes, slenderly built and flabby muscle. I found him holding his right arm in the position generally assumed after the ordinary dislocation at the shoulder and complaining of a great deal of pain. Upon stripping him I discovered not the ordinary luxation downwards into the axillary space, but one forwards, with the head of the bone resting under the clavicle, and the shoulder itself exhibiting more flatness and deformity than I had ever before seen.

The dislocation was reduced in a very few minutes by the method known as reduction by manipulation, which I need not stop to explain, which fortunate occurrence was greatly facilitated by the man being in a nearly fainting condition. After the reduction of the shoulder, I observed what I had nearly overlooked, from its being hidden by a flowing beard, viz., a partial dislocation of the sternal end of the clavicle outwards.

I had once before seen such a dislocation of the clavicle while serving as Assistant Surgeon in the U. S. Army, and having in that case failed to accomplish permanent reduction by any of the various means which were tried, I determined to let this one entirely alone, believing, as it was the source of no present pain or inconvenience, the patient would be, with the exception of a slight deformity, to him a matter of no consequence, none the worse for it.

Upon questioning this patient, he stated that when first sensible of his misstep, he had instinctively thrown out his arm to save himself, and struck with his whole force upon the partially extended arm. This is just the account we should have expected from the nature of the injury; indeed how else than by a force propagated in this way through the series of articulations concerned in the accident could it have been produced.

It is now several days since the occurrence, and he feels no inconvenience from the malposition of the clavicle, and scarcely any from the recent injury to the shoulder.

Fracture of both Femurs in a Child, Successfully Treated. By ARMISTEAD PETER, M. D., of Georgetown, D. C.

Late in the afternoon of May 19th, 1863, I was called to see Johnnie Ellis, æt. 6 years. Upon examination I found a compound fracture of the right femur, a simple fracture of the left; both limbs, at the point of fracture, were concave externally, convex internally, and both fractures occupied the upper fourth. But little tumefaction had taken place when I saw the patient (although several hours had elapsed since the reception of the in-

jury), owing, I suppose, mainly to the constant application of wet cloths. It being late in the afternoon, and having no splints suitable for so small a child, I made out of some thin cypress shingles four straight splints, placed the bones in apposition, put on my temporary splints and rollers, administered an opiate, and left my little patient for the night. The next day I had a pair of Desault's splints made, which, upon trial, suited admirably. These were adjusted to each limb externally, reaching from the axilla to the sole of the foot; I used internally the temporary splints of the evening before; they extended from the perineum to the malleoli. My adhesive strips, placed evenly along both sides of the limbs, carried through the holes of the foot-boards and tied, made all the extension that I could wish. Fearing the chafing and, perhaps, ulceration of the groin and perineum, I determined to do without counter-extending bands. The wound of the right thigh was closed with isinglass plaster and left to take care of itself, which it did most kindly. Of course I *watched* it most attentively with my *nose*, but never *interfered* with it. I have done this several times, in compound fractures of the ulna and radius occurring in young children, putting my splints and rollers on the same as for simple fractures, letting them remain until it was time to free the arm; I have never yet experienced any trouble in so doing. I allude to clean wounds where the solution of continuity was of no great extent. But I am digressing. My patient suffered very much at times with severe pains in the knees, but invariably had a good night upon the exhibition of 15 drops of the elix. opii. Once or twice he was threatened with intermittent fever, but this was soon checked by small doses of quinia administered every morning. I removed the splints June 16th (29 days from date of application), confident that union had taken place; my hopes were not disappointed; two weeks afterwards I had the pleasure of seeing the little fellow walking out. If there was shortening, it must have taken place *equally in both legs*, for he walked as well as he did previous to the injury. As for deformity, there is none. Several physicians here have seen the case, and saw it under treatment; they pronounce it a *perfect* cure, my preceptor, the venerable Dr. Joshua Riley, being among the number.

Compound Acupressure — A Substitute for the Ligature. By N. JEWETT AIKEN, M. D.

In cases of aneurism or wounds of arteries the circulation may be obstructed by this method without the continued irritation and sloughing that attend ligation. The artery is compressed at the point indicated between two needles, which, after being interlocked, are brought parallel and the external ends secured in this approximation; the compression of the vessel is to be maintained for a period of from six to twenty-four hours, or until a firm clot has formed, when the needles are removed and the wound closed.

The needles should be two or three inches long, of the size of common darning-needles or smaller, of steel, rather brittle or soft tempered in the outer or free portion, so as to be easily nipped off at the requisite length—the extremity of one having an eye bent in a short curve; the corresponding end of the other fitted to the eye and having a notch to interlock with it. Several needles, varying in the extent of the curve at the eye, so as to make the included parallel space more or less narrow, would adapt the operation to arteries of all sizes. A pair of nippers and well-waxed silk are also required.

Operation.—The first steps are the same as for ordinary ligation until the vessel is reached when the eye of the first needle (instead of the aneurism needle, but with its aid if necessary), is passed under the artery until the notch of the second can be engaged in it, when they are approximated sufficiently to bring together the inner walls of the artery and so obliterate the channel. A few turns of silk around the needles at the surface will make them secure, and the projecting ends may be removed with the nippers.

Probably, in most cases, a firm clot that will permanently obstruct the circulation would remain after six to twelve hours' compression. Then the needles may be removed, and the wound will readily heal. It might be necessary in some cases to continue the compression for twenty-four hours or longer, but seldom would this seriously retard the healing of the wound in healthy subjects.

To remove the needles it is only necessary to cut the silk that secures their approximation, separate the ends slightly, and by a little manipulation disengage the hook from the eye and gently withdraw them. The wound may be closed with strips of adhesive plaster, or treated according to the indications present in the case.

The advantage claimed for this method over the ligature is that it effectually obstructs the circulation with the least amount of irritation, and without causing sloughing; that it does not destroy the coats of the artery, but simply compresses them. It can be applied, perhaps, in less time than the ligature.

TEKONSHA, MICHIGAN, September, 1864.

Spotted Fever without Cerebro-Spinal Meningitis. By JAMES J. LEVICK, M. D., one of the Physicians of Pennsylvania Hospital.

At the present time, when the true nature of the so-called "spotted fever" is exciting much discussion both at home and abroad, the following notes of a case of this disease coming under the writer's care may not be uninteresting:—

During the prevalence of the epidemic of spotted fever in this city in the early part of last year I was called by my friend, Dr. Scholfield, to see Ellen C———, a tall and robust Irishwoman, residing near Eighth and Filbert Streets. She had been detained at a restaurant, where she was employed as cook, until a late hour of the preceding night. She went to bed at 2 A. M., apparently as well as usual. During the night she was seized with a chill, nausea, and vomiting. This latter continued throughout the night. She was seen by Dr. Scholfield at about 10 o'clock in the morning, and a few hours later by the writer, and presented the following appearance. She was sitting up, gave the history of her attack as noted above, said she had no pain in her head, but complained of severe pain in the region of the heart and epigastrium. The conjunctivæ were injected, and the pupils promptly responded to the stimulus of light. No pulse could be felt at the wrists or at the bend of the arm; the heart was acting feebly and irregularly.

The face presented an extraordinary appearance. On each cheek there were large, dark, purple extravasations of blood, varying from half an inch to an inch in size, while the interspaces were dotted with small petechiæ. On closer examination almost every part of the surface of the body was found to be thus spotted, the spots varying from patches of two inches in width to points not larger than the head of a pin.

Although regarded by us as too ill to be disturbed her removal was in-

sisted on by the people of the house, and the woman was soon after sent in a carriage to the Pennsylvania Hospital. When admitted she was unconscious and moribund, with great lividity of the surface, and she died at 2 P. M., just twelve hours after she had gone to bed apparently in her usual health.

From the time she was first seen by Dr. Scholfield she had taken freely of brandy and quinia.

The *autopsy* was made next day at 11 A. M., in the presence of Drs. Gerhard, Hartshorne, Morton, the resident physicians, and the medical class of the hospital. The appearances presented were as follows: *Exterior.* Rigidity well-marked. The entire surface of the body, excepting those parts on which it rested, was of a dull livid color. There were patches, as before described, on the face, chest, and abdomen, and numerous petechiæ on the legs. On cutting through the scalp there was an escape of dark fluid blood with which the vessels were turgid. A large ecchymosis was found on the left temporal bone, and smaller ones on other parts of the cranium. The meningeal vessels were filled with black blood. The most careful examination failed to detect any evidence of inflammation either in the substance of the *brain* or in its membranes. The *spinal cord* was removed in its entire length, and was examined both by the unassisted eye and with the microscope. It was of a firm consistence, and in every way free from disease.

The *lungs* contained a large quantity of dark fluid blood. There were blood stains on the pleuræ and on the arch of the aorta. The *heart* had undergone a slight fatty degeneration. It contained a large quantity of fluid blood; was free from coagula, excepting three soft clots about the size each of a pea. The *spleen* was firm and of the usual size. The *liver* congested and fatty. The *stomach* and *intestines* both on their outer and inner coats were dotted with innumerable blood spots. A large extravasation was found on the *pancreas*, and one entirely covering the summit of the *uterus*. In the *ovaries* several vesicles were found filled with black blood. A few spots were seen on the bladder, and a large number on and in the kidneys.

June 25, 1865.

DOMESTIC SUMMARY.

Cerebro-spinal Meningitis.—D. T. F. PREWITT gives (*St. Louis Med. and Surg. Journal*, May and June, 1865) a brief sketch of this disease as it appeared in his practice in the winter of 1861–62, in Livingston Co., Mo. The disease, he states, "first made its appearance among the soldiers stationed at Chilicothe, during an unusually severe and protracted spell of dry cold weather, and its true character not being at first recognized, it gave rise to a strong suspicion of poisoning, the delirium and dilatation of the pupils which existed in many of the cases suggesting stramonium, or some of the other vegetable narcotics as the poisonous agent. Measles had been prevailing also among the soldiery during the winter, and had proved fatal in some cases, but there is no evidence to show that the appearance of the two diseases, at the same time, or in succession, was more than a coincidence—a coincidence, however, that has been observed in other epidemics as well."

In all the cases seen by Dr. P., "headache, or rather what was described as severe pain in the head, was a marked symptom—so prominent a symptom indeed, that the disease was known in the counties where it prevailed as the 'Head

Disease.' Vomiting, too, was a constant symptom, and delirium was generally present at some period of the disease. The pulse varied, sometimes being but little accelerated, soft and intermittent, but generally quick, small, not hard and wiry, but weak and indicating rather prostration.

"There was but little disturbance of the bowels, and, usually, they responded readily enough to the action of cathartics. The tongue was moist, sometimes with a light brown coat upon it; sometimes almost normal in its appearance. Most of the cases complained of great soreness of the flesh, and all of those which proved fatal presented, in the course of the attack, the mottled appearance of the skin mentioned in the first case, but in none, except one, were there petechiæ. In one, a woman aged about 50, there were large livid-looking bullæ upon the feet.

"As far as I am able to recall the symptoms, spasmodic action of the muscles and opisthotonos did not exist to the extent they have been observed in other localities, although present to some extent in most of the cases."

Of the treatment Dr. P. has but little to say, none of the remedies he resorted to having led to satisfactory results.

Quinia produced no good effect, indeed he states it seemingly caused "a positive increase of the cerebral excitement."

"In one of the cases that recovered I treated by bleeding at the outset followed by a pretty free exhibition of opium combined with mercurials. The symptoms in this case were not so severe, however, as in the others. In the other case which recovered, the symptoms were slight, the left arm being somewhat affected, with some headache and nausea. Little or no medication was used in this case. Opium has been recommended with some degree of confidence by eminent practitioners, and is the only remedy to which any number of those who have treated concur in ascribing good effects."

An Epidemic of Typhoid, Typhus, and Spotted Fever.—Dr. T. J. Pearce, of Mechanicsburg, Ohio, states (*Cincinnati Lancet and Observer*, May, 1865) that residents of his place enjoyed during last summer and fall a remarkable immunity from all forms of fever. "In the month of October, however," he adds, "a soldier returned to his home in our town sick of typhoid fever. His case was well defined, of the enteric form, and confined him to his bed and room some six weeks.

"Before he had fairly recovered, his mother, a healthy woman, about forty years of age, was taken down with the same variety of disease, next a younger brother, and in quick succession other members of the family were attacked, and, finally, five of the same family were sick of typhoid fever within a few weeks from the recovery of the first case—none escaping but the father, a remarkably stout, healthy man.

"From this point of beginning, the disease spread to other families until the majority of the dwellings in that part of the village contained one or more cases of typhoid fever. Gradually it extended to other more distant neighbourhoods in town and country, and finally, this was our prevailing form of disease until in the following February, when it merged into, or gave place to several cases of the alarming disease known as Spotted Fever, which at the present writing, March 23d, has, I believe, subsided, leaving our community again reasonably free from disease.

"The disease, from its commencement to its close, selected its subjects alike from all classes of society. Ease and opulence gave no more immunity than squalor and poverty. The only preference it seemed to manifest was for women and children, there being very few adult males affected at any part of the season.

"The cases arranged themselves into three varieties, appearing to my mind at least, but separate links of the same chain of disease. First we had the well-defined typhoid fever of the enteric variety, next the well-marked typhus, and third, the spotted fever, which last form seemed but a rapid evolution of typhoid or typhus, produced by the same *materies morbi*, but of greater virulence or larger amount, and influenced in its manifestation by constitutional and predisposing differences. These different varieties were attended with all grades of

intensity, from the mildest grade of typhoid fever, in which the patient was scarcely sick enough to take his bed, to the gravest form of the same variety, in which the small and rapid pulse, the tympanitic abdomen, the frequent and involuntary alvine discharges attested the severity of the disease. The well-marked cases of typhus were few in number, compared with the first variety, but the same difference in intensity was manifested, and so of the last most fearful form, spotted fever. Like the cases of typhus, this last variety afforded us but few cases compared with the first, but it showed the same difference in grade. In some cases the patient complaining of but little more than loss of appetite, with pain in back portion of head and neck, with general soreness and uneasiness of body. In others again the disease would be ushered in with the usual chill, the surface soon becoming covered with petechial spots, and the organic nervous centres becoming so severely shocked by the specific cause that death would come to the little sufferer's relief before it had passed many hours or days in this alarming condition."

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Large Doses of Tincture of Digitalis in Delirium Tremens.—Dr. S. BARRETT narrates (*Buffalo Med. and Surg. Journ.*, Jan. 1865) the following case of delirium tremens successfully treated by large doses of tincture of digitalis:—

"On the 22d of July last, I was called to see Dr. S. R., aged 35, of Stafford. He has drank to excess for several years—has hardly been sober for the past four or five years. I found him with all those hallucinations incident to such cases; had not slept for two nights or days; been taking opiates, morphia, and hyoscyamus with camphor, and some stimulants; pulse 130 per minute, weak and tremulous; great thirst and constant restlessness, eyes staring, incoherent talking, and constant effort to divest himself of all clothing; I attempted to quiet him by giving chloroform, but it threw him into spasms, with very difficult breathing. When he came fully under its influence, he turned black in the face, and ceased breathing, the heart ceased to beat, and he had every appearance of being dead. I turned him on his right side, and kept up artificial respiration for some minutes, when the action of the heart commenced, and he soon began to catch for breath, and in a little time revived, but as delirious as ever. I then gave him ice to eat pretty freely and tinct. digitalis ℥ss, which he took readily, and ordered him to have the same dose every four hours until he became quiet and slept. I left him to return the next day.

"23d. Visited him to-day at 12 M.; found the doctor quiet, 'clothed, and in his right mind;' he had slept about six hours, had taken ℥jss of the digitalis; pulse normal, skin moist, thirst gone. From this time he convalesced rapidly. Six days after he called to see me; appetite good; says he had never felt better in his life.

"The few cases of this disease which have come under my care the past two years have been treated with this remedy, and the results have been to me every way satisfactory. That it is a specific I do not claim, only that it is worthy of trial."

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Influence of Alcohol upon Animal Temperature.—Dr. J. S. LOMBARD, of Boston, records (*New York Med. Journ.*, June, 1865) some experiments undertaken by him with a view to determine the extent to which alcohol is capable of influencing the temperature of the body.

The results, if correct, of these experiments, "go to prove, first, that alcohol possesses the power of increasing the temperature of the body; and second, that so long as the quantity taken be not excessive, this increase is not followed by any depression below the temperature existing before taking the alcohol. If, however, the dose of liquor be excessive, there will ensue a greater or less depression of all the functions, and with the rest, that of producing heat may suffer.

"But although the ingestion of alcohol causes a rise of temperature, yet its power in this respect is, so far as I can judge from my experiments, comparatively feeble to that exercised by muscular exertion, for I have almost invariably found that a very few moments' active exertion produces a considerably greater effect on the temperature of the body, than a large amount of alcohol.

"Still, cases frequently occur in which the body is exposed to the action of causes tending to reduce its temperature, while at the same time obstacles to muscular exertion exist, and in such cases alcohol may doubtless prove highly beneficial."

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Necrosis of the Femur.—Dr. J. Mason Warren has recorded (*Boston Med. and Surg. Journ.*, March 16, 1865) the following case of this:—

"Mr. F., 28 years of age, applied to me in February, 1864, on account of a necrosis of the femur, for which he requested to have an amputation performed. When he was 15 years old, he received a shock in the limb by jumping from a wall, which was followed by severe inflammation ending in abscess, which opened at the lower and inner part of the thigh, just above the knee. In the course of a year, abscesses formed along the whole length of the limb, communicating with the bone, some in front and some on the outer side, as high as the trochanter major; through these apertures small bits of bone were occasionally discharged. In the course of the first year, while bearing some weight on the leg, the femur gave way in its lower third, but united again, with shortening of three or four inches, and with a decided bend outwards. During the last eight years he has suffered much at the original site of the disease, the inflammation extending to the knee-joint, which is now nearly stiff. During nearly half of this period of thirteen years he has been confined by successive attacks of inflammation, and he finally decided to submit to an operation by seeing that his future usefulness and comfort were likely to be altogether destroyed. A consultation was held upon the case at the hospital, which resulted in the decision to remove the limb at the level of the highest fistulous opening, which was at the commencement of the upper third of the femur, and, in case the sequestrum should be found to extend higher, to attempt its forcible extraction by means of forceps, as I had before successfully accomplished in a similar case, where it was important to preserve as long a stump as possible. The exact amount of bone diseased could not be accurately determined, owing to the severe pain and protracted constitutional disturbance which had several times followed the attempt to probe the lower openings in the popliteal region, and which was explained on dissection by the proximity of the sequestrum to the popliteal nerve.

"The operation was performed Feb. 27th. A flap was first cut out on the front and outer side of the thigh, having its base at the upper aperture already described, which was placed rather on its inner aspect. An inner and posterior flap was then made, and the bone sawed off just above the point of junction of the flaps, which proved to be in the sound bone, three-quarters of an inch above the upper extremity of the sequestrum. This was about four inches long, and lay loosely encased in a cavity in the back and lower portion of the femur, which was open for the most part, but was crossed at about the middle of its length by a bridge of new bone of about half an inch in breadth. The nerve, as above stated, lay directly on it. The sequestrum was so loose that it could have been entirely removed if it had been possible to reach it by any justifiable operation. The knee-joint had been partially disorganized by inflammation, two small surfaces, however, remaining on the condyles still covered by cartilage, each about half an inch in diameter, and corresponding to the articulating surfaces of the tibia, which were concerned in the slight motion remaining. On the curved portion of the bone, in front and opposite to the sequestrum, were marks of the very oblique fracture which had taken place during the first year of the disease. The specimen is now in the Warren Anatomical Museum.

"In connection with this case, I have been led to the remark that I have seen very few cases of extensive necrosis of the femur which have been relieved by operation. The records of the Massachusetts General Hospital show the same fact. In one case, a young man, I removed half of the shaft, near its lower extremity, with perfect relief; in another case, of twenty years' duration, which was one of necrosis of the whole length of the shaft of the bone, the operation was followed by so long and exhausting suppuration as to compel the amputation of the limb just below the trochanters, to save the patient's life. Curious to relate, this man afterwards died of an extensive cancer of the stump. In the present case, even if the removal of the dead bone had been practicable, the

patient would have been left with a deformed limb, three or four inches shorter than its fellow, and with little or no useful motion of the knee-joint.

"It may be interesting to mention that in this case, as is usual where there has been much previous inflammation in the amputated limb, the hemorrhage from the smaller vessels was very abundant.

"The convalescence was slow, and interrupted by a series of abscesses in the stump. Although no exfoliation of bone took place, it was several months before the patient was well enough to return to his home in the country, but with his stump only partially healed. In October, 1864, I saw him in fine health and high spirits, his stump entirely healed, and having gained thirty or forty pounds of flesh. This increase in weight, as is well known, is not unusual in persons who have submitted to amputation after having gone through with a long suppuration from a diseased limb."

—

Gunshot Wound of the Bladder.—Dr. W. H. VAN BUREN records (*New York Med. Journ.*, May, 1865) the following interesting case of this :—

"L. L. J., 46, married, and father of a large family, in sound health, and of good constitution, was wounded at 5 o'clock P. M., on the 16th July. He had not emptied his bladder since leaving home, about 9 o'clock A. M.; had attended to his business as usual down town, and dined at Delmonico's at 3½ o'clock P. M., drinking moderately of Bourbon whiskey. Was conscious that his bladder was distended before receiving his wound. I saw him half an hour after he was struck; he was pallid and moderately collapsed. Stated that when struck by the ball, it seemed to him as though a foot-ball had hit him in the belly. His first motion was, to put his hand to the part when he recognized that he was deluged with water (urine); he then sank to the ground, and was carried to his house, about two hundred yards distant. I found a wound—which would readily admit my forefinger—in the lower part of the belly, 1¼ inch to the left of the median line, and 2 inches above the brim of the pelvis. The finger passed to its full length into the wound; could be moved freely in any direction in a cavity behind the abdominal walls, where nothing could be satisfactorily distinguished but coagulated blood. Urine still flowed from the wound, and the patient's trowsers and shirt were saturated with it. In both of these garments there were rectangular holes, with obvious loss of substance. On careful percussion above the pubes, there was no evidence of distended bladder, or any collection of fluid, nor could anything abnormal be discovered from the rectum. Under the skin, on the back of the right buttock, about one inch above the summit of the ischiatic notch, a bullet could be distinctly felt. This was afterwards removed by a simple incision, and no exploration made by the finger from this quarter; there was no discharge of urine from this incision—which healed kindly in a week.

"The course of the ball was apparently, therefore, directly across the pelvis from left to right, and from before backwards on a level with the anterior superior spines of the ilium. No other lesion was discoverable. The abdomen was soft, natural, and not tender; somewhat prominent—the patient weighing 165 pounds, and measuring 5 feet 9 inches in height. His bowels, as usual, had moved naturally in the morning. The pain was slight, but there was strong and pretty constant desire to void urine, although not a drop could be passed through the urethra; from time to time a little would escape through the abdominal wound, tinging the cloths slightly with blood.

"After a careful study of the indications for treatment which the case presented, it was decided not to introduce an instrument into the bladder by the urethra, and to favour the free flow of urine from the wound, as far as possible, by position. One-fourth of a grain of sulphate of morphia was ordered to be given at once, and repeated every second hour, with good beef-tea for nourishment, and nothing else save ice and water moderately. At 10 o'clock P. M. he was engaged in arranging some matters of business; had recovered from collapse almost entirely; no complaint of pain or desire to pass water; pulse 80, and of good volume; abdomen soft and hot, tender on pressure; urine flowing from the wound. Morphia continued.

"From this date there was no bad symptom. The urine continued to flow

from the wound freely, and without interruption. Its escape was found to be facilitated on moving the trunk or pelvis, and especially by rolling over upon the left side. The only dressing applied to the wound was a moistened rag.

"The morphia acted very kindly, and it was repeated steadily as first ordered, until the eighth day, when it was suspended to facilitate the action of half an ounce of castor oil, which produced two copious stools, unaccompanied by pain or blood—the first motions since the day of the wound. Meanwhile there has been no pain whatever complained of, nor any on pressure of any part of the abdomen, which continued soft and supple, the colon only becoming moderately distended by gas, of which the patient was able to relieve himself *per anum*. The pulse on the third day reached 100, and showed a little hardness and tension. Nothing was done, and it gradually subsided. On the ninth day, after the action of the oil, it was 66. After this the morphia was only administered occasionally to quiet restlessness. On the seventh day, for the first time since the evening, he was wounded, the patient felt a desire to pass water, and did so twice, with slight uneasiness in the act; it was turbid in appearance, and deposited a sediment looking like pus. On examining this sediment by the microscope, however, it was found to consist mainly of vesical mucus and oil-globules, with some pus-corpuscles, and a few crystals of oxalate of lime and of the triple phosphate.

"On the eighth day, after passing water by the urethra, he experienced quite a severe pain in the right thigh below the great trochanter, which lasted more than an hour, and for which he took a dose of morphia. This annoyed him so much that he preferred to empty his bladder through the wound, which he continued to do without difficulty until the fifteenth day, when I advised a new trial of the natural route. This was followed by less pain, and from this time he used the urethra entirely, at intervals of three and four hours. The wound, which up to this time had been coated by the urine salts, rapidly became clean, discharging only a trifling quantity of healthy pus. At this time, as there was no evidence of pelvic or abdominal trouble, that could be elicited by pressure, coughing, movements of the trunk and hip-joints, or action of the bowels, his diet was gradually improved.

"On the twenty-second day the wound was entirely healed, and the patient's general condition in every respect satisfactory.

"No shreds of clothing nor spiculæ of bone were discharged from the wound, and there has not been any abscess or evidence of local trouble. The temperature, during the first two weeks of his confinement, was never below 80°, varying from this to 92°.

"I have examined and conversed with Mr. Jay this day, more than eighteen months since his accident. He is in perfect health, and is not aware of any defect whatever in the normal performance of his urinary function; nor has he any symptoms of trouble in this quarter since his recovery. At present he never has occasion to pass water more than four times in the twenty-four hours, and generally three times. Before his wound his calls were even less frequent, occurring, as a rule, rarely more than twice in the twenty-four hours.

"The rapid recovery of this patient from so severe a wound was due, in some degree, to his placid disposition and excellent nursing, but mainly, I suspect, to the very considerable distension of the bladder, at the moment the musket-ball traversed his pelvic cavity. The peritoneum was probably carried up by the distended bladder above the track of the ball, although, considering the point of exit, this cannot be regarded as certain. The entire absence of any symptoms of urinary infiltration into the connective tissue of the pelvis, is as remarkable as the escape from peritonitis, and is most readily explained by the size and directness of the abdominal wound, which afforded prompt and free outlet for the urine. It was this feature of the case which induced me to refrain from the use of the catheter, as generally employed in wounds of the bladder; and the prompt subsidence of the desire to urinate, after the first dose of morphine, conduced also to this course—which I see no reason to regret.

"The continuous presence of a catheter in the urethra and bladder of a man, already suffering from a most serious wound, is no trifling addition to the burden he has to bear, and although, in deference to all high authorities from Chopart and the Larreys to Legouest and Hamilton, the use of the instrument

is properly regarded as the rule in gunshot wounds of the bladder, the result of this case demonstrates that the rule may be occasionally disregarded, to the advantage of the patient."[1]

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Poisoning by Veratrum Viride.—Dr. J. C. HARRIS, of West Cambridge, records (*Boston Med. and Surg. Journ.*, April 27, 1865) the following case:—

J. C., aged one year and six months, was attacked with pneumonia, from which he made a good recovery, the chief remedy in the active stage being veratrum viride—the dose being four drops of the tincture, repeated every four hours. When the child ceased taking the veratrum, there remained forty or fifty drops mixed with water, in the proportion of four drops to a teaspoonful, which the mother saved for future use, keeping it in a cup four or five days, then pouring it into a bottle. About six weeks after this, the child caught cold, was feverish, and had some difficulty in breathing. The mother commenced giving the veratrum every half hour, in teaspoonful doses of the mixture she had saved, until four or five doses had been given, a tablespoonful was given for one dose by mistake. The whole quantity taken was probably not less than thirty-five drops, for the four or five days' evaporation must have increased the proportionate strength of a dose at least one drop.

There was an effort to vomit after the second dose, but without ejecting anything from the stomach. Efforts to vomit were made every few minutes, but without success, except once, when a small quantity passed from the mouth. I was called to the child about seven hours after taking the first dose. I found him apparently unconscious, very pale, breathing heavy—almost stertorous; pulse 40, extremities cold, and a profuse cold perspiration over the whole body. These symptoms I supposed were the result of the large doses of the veratrum. I made no attempt to remove the contents of the stomach, but ordered mustard paste to be applied to the chest, abdomen, and extremities, and carbonate of ammonia and camphor—three grains of the former to one of the latter—every hour, and a drachm of brandy intermediately. This treatment was kept up until the child died, about thirteen hours after taking the first dose of the veratrum.

Remarks.—This child had always been feeble, and his mother was in the habit of frequently dosing him for real or imaginary sickness. It is possible, if not probable, that the result would have been different had there been free emesis within an hour or two after taking the medicine. I did not attempt to remove the contents of the stomach, for the case seemed almost hopeless when I first saw it.

This is the first case of death from an overdose of veratrum viride I have seen or heard of, and therefore it is possible I did not pursue the best course of treatment.

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[1] In his recent admirable *Treatise on Military Surgery*, p. 3718, Professor Hamilton records a case of recovery from gunshot wound of the bladder, in which the catheter was never introduced.

MEDICAL DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA.

AUXILIARY FACULTY OF MEDICINE.

THE Trustees of the University of Pennsylvania, feeling that the regular course of instruction in medical colleges does not embrace all the branches of knowledge specially subservient to medicine or closely connected with it, and that it is highly desirable that provision should be made for teaching all the sciences, an acquaintance with which is, in a greater or less degree, essential to a complete and thorough medical education, have established in connection with the Medical Department of the University of Pennsylvania a Faculty to be denominated

The Auxiliary Faculty of Medicine.

The Faculty shall comprise five Professorships, viz:—

1. ZOOLOGY AND COMPARATIVE ANATOMY.
2. BOTANY.
3. MINERALOGY AND GEOLOGY.
4. HYGIENE.
5. MEDICAL JURISPRUDENCE, INCLUDING TOXICOLOGY.

The occupants of these chairs shall constitute the Auxiliary Faculty of Medicine.

The three branches of Natural History forming the subjects of the three Professorships first mentioned shall be taught mainly in reference to their medical relations, and in other respects only so far as may serve to give a general view of the subject, whereby the several facts may be duly connected and arranged.

Each Professor shall receive a salary of Five Hundred Dollars per annum, together with the whole of the fees paid for attendance upon their lectures respectively; provided, however, that the fee shall not exceed ten dollars from each pupil for each Professor; but all students who have matriculated regularly in the Medical Department of the University of Pennsylvania, and have taken the tickets of at least two of the Medical Faculty, shall have the right of gratuitous admission to the lectures. Attendance upon these lectures is not compulsory upon the students in the Medical Department.

The several courses shall consist of at least thirty-four lectures, to be delivered, at hours fixed by the Faculty, three times a week during the months of April, May, and June, commencing on the first Monday in April, and ending on the last Saturday in June.

The Professors shall be appointed for one year, after public notice of at least three months, at the regular meeting of the Board of Trustees in November next, nominations having been made at a preceding meeting; and shall be reappointed annually thereafter, during satisfactory service, at the regular meeting of the Board in the same month, so long as the plan now adopted for the establishment of an Auxiliary Faculty of Medicine shall continue in operation.

By order of the Board of Trustees.

CADWALADER BIDDLE,
Secretary Trustees of the University of Pennsylvania,
420 Walnut St., Philadelphia.

BELLEVUE HOSPITAL MEDICAL COLLEGE—CITY OF NEW YORK.

SESSION FOR 1865-66.

The Trustees and Faculty announce, with much gratification, the evidence offered by the past sessions of the importance of the new movement in behalf of medical education, inaugurated by this College.

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Lewis A. Sayre, M. D., Professor of Orthopedic Surgery.
Alexander B. Mott, M. D., Professor of Surgical Anatomy.
Stephen Smith, M. D., Professor of the Principles of Surgery.
Isaac E. Taylor, M. D.,
George T. Elliot, M. D.,
B. Fordyce Barker, M. D., } Professors of Obstetrics and the Diseases of Women and Children.
Benjamin W. McCready, M. D., Professor of Materia Medica and Therapeutics.
Timothy Childs, M. D., Professor of Descriptive and Comparative Anatomy.
Austin Flint, M. D., Professor of the Principles and Practice of Medicine.
R. Ogden Doremus, M. D., Professor of Chemistry and Toxicology.
Austin Flint, Jr., M. D., Professor of Physiology and Microscopy.
Henry D. Noyes, M. D., Demonstrator of Anatomy.
N. R. Moseley, M. D., Associate Demonstrator of Anatomy.
J. W. Southach, Jr., M. D., Assistant Demonstrator of Anatomy and Prosector to the Chair of Operative Surgery and Surgical Pathology.
A. W. Wilkinson, M. D., Assistant to Chair of Chemistry and Toxicology.
George Engs, M. D., Assistant to Chair of Principles and Practice of Medicine.

The *Preliminary Term* will commence on *Wednesday, September* 13, 1865, and continue four weeks. Instruction, during this term, will consist of didactic lectures on special subjects and daily clinical lectures. The lectures during this term are given exclusively by Members of the Faculty. The *Regular Term* will commence on *Wednesday, October* 11, 1865, and end early in March. The plan of instruction in this Institution is to combine, to the fullest extent, clinical and didactic teaching. All the lectures are given within the hospital grounds. Four didactic lectures are given on every week day, except Saturday, and from two to three hours daily are allotted to clinical teaching. The Annual Circular will contain further details respecting the plan of instruction, together with the vast opportunities for the study of disease, witnessing surgical and obstetrical operations, the prosecution of anatomy, etc, offered by the Bellevue Hospital, the Blackwell's Island Hospital, and other Public Institutions of the great Metropolis.

Fees for tickets to all the lectures during the Preliminary and Regular Term, $105.
Tickets for any of the several departments may be taken out separately.
Matriculation fee, $5.
Demonstrator's ticket, $10.
There are no Dissecting Room fees, nor any charge for subjects.
Hospital tickets are gratuitous, after Matriculation.
Graduation fee, $30.

Students who have attended two full courses in other accredited schools, receive all the tickets for $50, exclusive of the Matriculation fee. Students who have attended two full courses in this College, or after one full course in this College, having previously attended a full course in some other accredited school, will be required to matriculate only. Graduates of other accredited schools,* after three years, are required to matriculate only; prior to three years they receive a general ticket for $50.

Payment of fees invariably required at the commencement of the Session. There are no exceptions to this rule, and students should come prepared to take out their tickets immediately.

Students, on arriving in the city, are requested to report at once at Bellevue Hospital, situated on the East River, between 26th and 28th Streets, and inquire for the Janitor, Mr. Silas Pearsall, who will take pains to aid them in securing comfortable accommodations, without delay.

Entrance to the Hospital is on 26th Street.

For the Annual Circular, giving further information, address the Secretary of the Faculty, Professor Austin Flint, Jr., Bellevue Hospital Medical College, or 257 Fourth Avenue, New York.

* Eclectic and Homœopathic schools are not accredited.

HARVARD UNIVERSITY.

MASSACHUSETTS MEDICAL COLLEGE.

The annual course of Medical Lectures of Harvard University will commence at the Massachusetts Medical College, in North Grove Street, Boston, on the first Wednesday of November, 1865. The regular course will be as follows:—

Obstetrics and Med. Jurisprudence,	by Professor	D. Humphreys Storer, M. D.
Morbid Anatomy,	" "	John B. S. Jackson, M. D.
Clinical Medicine,	" "	Henry I. Bowditch, M. D.
Anatomy and Physiology,	" "	Oliver W. Holmes, M. D.
Theory and Practice of Medicine,	" "	George C. Shattuck, M. D., and
	" Adj. Prof.	Calvin Ellis, M. D.
Surgery,	" Professor	Henry J. Bigelow, M. D.
Chemistry,	" "	John Bacon, M. D.
Physiology and Pathology of the Nervous System,	" "	C. E. Brown-Séquard, M. D.
Materia Medica,	" "	Edward H. Clarke, M. D.

Demonstrator, David W. Cheever, M. D.

Clinical, Medical, and Surgical Instruction will be given at the Massachusetts General Hospital, with Surgical Operations.

Collateral special medical instruction will also be given at the Hospital by Lectures and otherwise, by Drs. Abbot and Ellis.

Abundant material is afforded for the study of Practical Anatomy. The Room devoted to this department is open day and evening, and lighted by gas.

Fees for the Lectures, $95; Matriculation fee, $3; Graduation fee, $20.

Good Board can be obtained at $4 00 to $6 00 per week. Boarding places provided on application to the Janitor at the College.

Students are requested, upon coming to Boston, to call upon the Dean.

GEORGE C. SHATTUCK, *Dean of the Faculty,*

July 1, 1865. *No. 2 Staniford Street, Boston.*

BOYLSTON MEDICAL PRIZE QUESTIONS.

The Boylston Medical Committee, appointed by the President and Fellows of Harvard University, consists of the following Physicians:—

Edward Reynolds, M. D.	J. B. S. Jackson, M. D.	Charles G. Putnam, M. D.
John Jeffries, M. D.	J. Mason Warren, M. D.	Morrill Wyman, M. D.
S. D. Townsend, M. D.	D. H. Storer, M. D.	Henry J. Bigelow, M. D.

At the Annual Meeting held June 1st, the Premium was awarded to Henry W. Williams, M. D., for the best Dissertation on *Recent Advances in Ophthalmic Science.*

The following questions are proposed for 1866:—

1. *Treatment of Painful Affections of the Nerves following Gunshot Wounds.*
2. *Cerebro-Spinal Meningitis.*

Dissertations on these subjects must be transmitted, post paid, to John Jeffries, M. D., *on or before the first Wednesday in April,* 1866.

The following are the questions proposed for 1867:—

1. *Pathology and Treatment of Diseases of the Skin.*
2. *Amputation, its Varieties and Occasional Results, Gangrene and Necrosis.*

The author of the best dissertation on either of the subjects proposed for 1866 and 1867, will be entitled to a premium of *ninety dollars,* or a gold medal of that value.

Each dissertation must be accompanied by a sealed packet, on which shall be written

BOYLSTON MEDICAL PRIZE QUESTIONS—Continued.

some device or sentence, and within which shall be inclosed the author's name and residence. The same device or sentence is to be written on the dissertation to which the packet is attached.

The writer of each dissertation is expected to transmit his communication to the Chairman of the Committee, in a legible handwriting, within the time specified.

All unsuccessful dissertations are deposited with the Secretary, from whom they may be obtained, with the sealed packet unopened, if called for within one year after they have been received.

By an order adopted in 1826, the Secretary was directed to publish annually the following votes:—

1st. That this Board do not consider themselves as approving the doctrines contained in any of the dissertations to which premiums may be adjudged.

2d. That in case of publication of a successful dissertation, the author to be considered as bound to print the above vote in connection therewith.

J. MASON WARREN,
Secretary.

Publishers of Newspapers and Medical Journals throughout the country are respectfully requested to notice the above.

UNIVERSITY OF NEW YORK.

MEDICAL DEPARTMENT. SESSION—(1865–66.)

The Session of 1865–66 will begin on Monday, October 16, and will be continued until the 1st of March.

FACULTY OF MEDICINE.

Rev. Isaac Ferris, D. D., LL. D.,	Chancellor of the University.
Martyn Paine, M. D., LL. D.,	Professor of Materia Medica and Therapeutics.
John W. Draper, M. D., LL. D.,	Professor of Chemistry and Physiology.
Alfred C. Post, M. D.,	Professor of the Principles and Operations of Surgery, with Military Surgery and Hygiene.
William H. Van Buren, M. D.,	Professor of General and Descriptive Anatomy.
John T. Metcalfe, M. D.,	Professor of the Institutes and Practice of Medicine.
Charles A. Budd, M. D.,	Professor of Obstetrics, the Diseases of Women and Children, and Clinical Midwifery.
Alfred L. Loomis, M. D.,	Adjunct Professor of the Institutes and Practice of Medicine.
J. W. S. Gouley, M. D.,	Adjunct Professor of Anatomy and Demonstrator of Anatomy.
Abraham Jacobi, M. D.,	Clinical Professor of the Diseases of Children.
F. D. Weisse, M. D.,	Clinical Lecturer on the Diseases of the Skin.
J. H. Hinton, M. D.,	Prosector to the Professor of Surgery.
Louis Fernandez, M. D.,	Assistant Demonstrator of Anatomy.

Besides daily Lectures on the foregoing subjects, there will be six Clinics, weekly, on *Medicine*, *Surgery*, and *Obstetrics*.

The Dissecting-Room is open from 8 o'clock A. M. to 10 o'clock P. M.

Fees for a full course of Lectures	$105 00
Matriculation fee	5 00
Graduation fee	30 00
Demonstrator's fee	5 00

*** The usual autumn preliminary course, which is free to those who attend the winter Session, will begin on Monday, September 4th.